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30 MARCH 1987

Europe/Latin America Report

SCIENCE AND TECHNOLOGY

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EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

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WEST EUROPE

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FRG COMMISSION URGES CLEAR GUIDELINES FOR GENETIC ENGINEERING

Duesseldorf VDI NACHRICHTEN in German 23 Jan 87 p 1

[Article by G. Hartmut Altenmueller: "'Genetic Engineering' Commission of Inquiry Presents Its Report: No Blinders, But Firmly in Hand: No Straitjacket for Genetic Engineering Research, Only Clearly Defined Guidelines"]

[Text] Bonn, 23 Jan 87 (VDI-N)--Before genetic engineering methods are introduced into industry, agriculture and medicine on a wide-scale basis, society should provide them a framework for responsible conduct. The extensive report by the Bundestag's "Chances and Risks of Genetic Engineering" commission of inquiry should be the starting point for this. Last Monday, it was made available to the public after over 2 years of work.

The chairman of the commission, SPD Bundestag member Wolf-Michael Catenhusen, stressed societal acceptance for the use of genetic engineering, caution with regard to conceivable risks and the exclusion of discernible dangers--in individual cases even using bans--as the most important principles of the study. In his view, this is the first time that it has been possible to socially and politically evaluate a type of technology in a timely fashion. There was a large degree of agreement within the commission, which consisted of nine Bundestag members and seven outside experts, about both the areas that are to be supported and the restrictive measures to be taken. Nevertheless, the Greens consider this attempt at an assessment of the technological consequences to be a failure; in a special statement, they complained that no alternatives to genetic engineering have been discussed, and they made it clear that they reject this technology on principle.

In its report, which Catenhusen explicitly described as a compromise, the commission declares that the application orientation of fundamental research should not become a generally applicable principle of state support for research, but rather that developmental freedom should be preserved. Besides application-oriented genetic engineering research in pharmaceutical research projects, the entire range of other possible applications should also be taken into consideration, according to the report. While the CDU/CSU commission members and three experts from the field of science and technology warn in a supplemental statement of too comprehensive regulations because they could restrict the possibilities of genetic engineering, the Social Democratic

members, together with two experts (from the scientific research community and from the trade unions) emphasize the social bond of genetic science. They call for a federal law establishing support for research as a joint responsibility of the federal government and the Laender. They also desire a pluralistic "Association for Genetic Engineering Issues," corresponding to a similar institution for environmental questions.

In terms of the application of genetic engineering to humans, a central council under the federal Ministry for Research and Technology or under the Bundestag is suggested, in addition to the local ethics commissions.

If the Bundestag and the federal government follow the recommendations of the inquiry commission, the application of genetic engineering to humans will be more restricted in the FRG than anywhere else in the world.

While genetic engineering methods are recognized as being promising in the development of a new generation of raw materials, in the transformation of raw materials into refined chemicals, in the cultivation of plants and in animal breeding, as well as in environmental protection, for example, but also in the manufacture of pharmaceuticals--admittedly linked to a network of precautionary and safety measures--the commission would like to see tight limits drawn for analyses of human hereditary factors (genomic analysis) as well as for gene therapy. The security guidelines for genetic engineering experiments in the lab should be tightened--and should be extended to industrial production, acquiring a legal character; to this end, the Federal Epidemic Act should be renamed the "Biological Safety Regulation Act."

The commission takes a differentiated position on the release of organisms altered by genetic engineering: For viruses, it recommends a basic ban, with exceptions for vaccines and pest control, while in the case of microorganisms a check should be made after 5 years to determine whether their release should continue to be prohibited; the commission calls for a medium-term program on safety research from the Ministry for Research and Technology. The release of plants altered by genetic engineering must be approved by the Federal Health Office; for animals, the release must be "reversible," meaning drastic restrictions on small organisms.

With the exception of army medicine, military research in genetic engineering should not be permitted. The transfer of genetic engineering to Third World countries should be intensified.

12271
CSO: 3698/298

CELL RESEARCH CENTER PROPOSED TO KEEP TOP SCIENTISTS IN FINLAND

Helsinki HELSINGIN SANOMAT in Finnish 18 Jan 87 p 33

[Article by Juhani Aromaki]

[Text] Prof Leevi Kaariainen has had occasion to see many top Finnish biotechnology scientists pack their bags and leave for more desirable jobs in other countries. He heads the University of Helsinki's Institute for Genetic Engineering, another of whose key scientists is moving to Sweden.

"Ralf Petterson is leaving to head the Ludwig Cancer Institute, founded in connection with the Karolinska Institute. His loss will be a great one for the institute. The situation is hopeless and we should now quickly implement ways of stopping this exodus," the professor warned.

A year ago the departure of lecturer Tapio Palva and six other scholars for Uppsala from the Institute for Genetics caused a stir in the university world. The Group had gotten tired of begging for uncertain grants and fighting with jealous cliques.

In Leevi Kaariainen's opinion, we ought to get our good scientists back. He was, however, to be disappointed again when Henrik Garoffkin, who had worked in Heidelberg, decided to start working as a professor of molecular biology at the university hospital in Huddingen, subsidiary to the Karolinska Institute, in early April instead of in Finland.

We Finns are no longer, however, just moaning about these losses. SITRA (1967 Anniversary of Finnish Independence Foundation) has responded to numerous requests for aid and promptly had a study made of the need for molecular biology and genetic engineering research centers in Finland. The plan for a cell research center (SOLUT) was made public last Wednesday. Education Ministry officials seriously intend to get appropriations for it as early as in the 1988 budget.

Three other groups are also at present studying the development of biotechnology. TEKES (Technological Development Center) is preparing its own report. At the Agriculture and Forestry Ministry they are considering new possibilities in the fields of agriculture and forestry.

Big Center to Go to Science Park

Molecular biology and genetic engineering are the most promising fields of modern biotechnology. Large sums have been invested in these fields in many countries. In Finland there are a couple of hundred scientists who utilize genetic engineering methods in research institutes and business firms.

"The prerequisites for research in this field are lagging alarmingly behind developments in other countries. In Finland we absolutely cannot afford to remain on the sidelines. The SOLUT plan would quickly provide opportunities to make advances in certain fields without having to constantly worry about operating funds and research equipment," Leevi Kaariainen said.

In Finland there is neither enough training nor jobs for researchers. There is a shortage of the necessary research equipment. Even the few researchers we have are scattered about. According to the experts, we need a big research center that would bring together a sufficiently broad "group of scientists who engage in so-called critical research."

According to the SITRA study group, the SOLUT research center would be set up in Pitajanmaki near Helsinki in connection with the University of Helsinki's Genetic Engiineering Institute. During the initial phase 60 researchers would be employed there. Eight million markkas would be needed to expand the facilities and 15 million for equipment procurements in 1987-1990.

During that 3-year period SOLUT would also with top foreign scientists develop a molecular structure team whose equipment expenses would amount to 15 million markkas.

During the second phase, after 1990, they plan to develop the institute into an important, internationally respected cell research center. The center would be moved to a science park to be designed by the University of Helsinki in the early 1990's, at which time there would be 150 people at the center. About 10 of them would be top foreign scientists.

"Finland is certainly an exotic country for foreigners, but not, however, particularly attractive because of its climate of location. If we intend to get top scientists in this field to come to Finland as guest scholars, we can only lure them here to the far north with top research facilities and a good environment in which to work. And then we can perhaps get our own top scientists to come back to Finland too," Leevi Kaariainen said.

The University of Helsinki's goal is to get firms and foreign university research institutes involved in the same fields into the science park alongside our own institutes concentrating on the biological sciences. They plan to build a "green valley of Viikki" in Viikki near Helsinki. The University of Helsinki also has the same sort of plans for the Kumpula area near Helsinki.

According to the study, university biochemistry, genetics, genetics applied to agriculture and forestry and material research units, among others, would be located in the science park.

The plan has also been presented to several ministers, who consider the project to be an important one. University officials are just afraid that this business too may be unnecessarily delayed because of the parliamentary elections.

Several biological research centers modeled after foreign ones may be created in Finland. In Oulu they already have their own biological research center and, in addition to Helsinki, in Turku, Jyvaskyla and Kuopio they are considering their own research projects.

Nordic Countries Invest

Following Sweden's lead, the other Nordic countries are investing considerable sums in biotechnology. The first big investments in biotechnology in Sweden were made in the early 1980's. Sweden has fairly big plans. In its report prepared in October, the Biotechnology Committee proposed that budget appropriations be increased to 190 million markkas a year for a 10-year period. The portion of this that would go into cell research would be about 100 million markkas a year.

They recommend 105 million markkas a year for basic research, 20 for reporting and information services, 30 for training and 35 for target research. Firms will, in addition, invest about 245 million markkas a year in biotechnology.

The Finnish Government is supporting research in this field with 25 million markkas a year, about 15 million of which goes into cell research. In addition to the university institutes, the most important research centers are the VTT (State Technical Research Center) biotechnology laboratory with its genetic research team, the National Health Agency and Keskuslaboratorio Oy [Central Laboratory Company].

Genesit Oy, which owns several industrial firms, is investing 12 million markkas in research in this field in accordance with its 5-year plan.

"A few years ago Finland was in a good position, even ahead of its neighbors, but, if we don't get going now, in 3 years time we'll be far behind the other Nordic countries," Leevi Kaariainen fears.

In the professor's opinion, we ought to also quickly begin new research on the structure of the molecule.

"An important area is research on the structure of protein space, by means of which they are trying to pinpoint the location of every amino acid in protein. We are not working on this yet in Finland, but it's absolutely necessary for us to do so. Only after that can we begin to on the basis of knowledge at this level improve the effectiveness of our performance, for example, and our activities under different circumstances."

Following lecturer Tapani Palva's departure for Sweden, it is, in Leevi Kaariainen's opinion, important for us to again gain momentum in our research on the molecular biology of plants and especially in the transmission of genes to plants in connection with this. The cell research center could open the way to progress in these areas too.

"The crisis in Finland is now a very serious one. We must obtain funds for so many of our needs: the training of researchers, the improvement of researchers' bare subsistence wages, equipment and institutes. We must build a framework that will attract top foreign scientists to come to Finland. We must create opportunities so that we can at some time yet get people like Tapio Palva, who has already earned the distinction of having directed some 40 top men and of having inspired research teams with ideas, to return. There is a severe shortage of such people in both Finland and Sweden," Leevi Kaariainen said.

11,466
CSO: 3698/237

BRIEFS

EEC PROGRAM PLANNING--On 18 July the Commission published a call for expressions of interest in participation in a multiannual programme of development and demonstration activities, with the aim of stimulating agro-industrial development, in the context of Community initiatives for the promotion of biotechnology. The fields which this programme might cover are described in the Commission discussion paper entitled "Biotechnology in the Community--Stimulating agro-industrial development'. The call is intended to enable the Commission to make a better assessment of the degree of interest in and the prospects offered by the topics in question and to help in establishing contacts between participants, should it be decided to launch such a multiannual programme. [Text][Brussels BULLETIN OF THE EUROPEAN COMMUNITIES in English No 7/8 Nov 86 p 33]/12828

CSO: 3698/A140

FRG'S SUPRENUM: MIMD ARCHITECTURE, MULTILEVEL PRINCIPLE

Stuttgart DIE COMPUTER ZEITUNG in German 24 Dec 86 p 12

[Article: "Three Computers in One. SUPRENUM: New Construction Principle Should Aid Success of German Supercomputer"]

[Text] It has been a long time since German scientists and engineers were a subject of discussion in the world of computers. You would have to go all the way back to the birth of the computer 50 years ago when Konrad Zuse presented the first prototype of an automatic computer. A supercomputer project called SUPRENUM ought to once again place the FRG's computer sector in the company of the trendsetters in America and Japan. The new MIMD computer architecture is the unique aspect of this project which is being supported by the Federal Ministry for Science and Technology. It combines three design principles (supercomputing, multiple-processor technology and multilevel computing), previously employed individually, into one architecture. The exclusively German development efforts are taking place at SUPRENUM GmbH which was founded solely for this purpose; the main parties responsible for the project are the Gesellschaft fuer Mathematik und Datenverarbeitung (GMD), Krupp Atlas Elektronik and Stollmann. Dr Ulrich Trottenberg, the company's general manager, described the objectives of this large-scale project to DIE COMPUTER ZEITUNG.

Multiple-processor systems and the multilevel principle are the two key concepts which can be used to characterize the SUPRENUM project. SUPRENUM stands for "supercomputer for numerical applications." Nearly a dozen industrial, university and large-scale research facilities are working on this joint project with the objective of producing an overall system comprising hardware, basic software and numerical applications software on which numerical algorithms can run at superfast speed. The first prototype and several smaller systems are expected to be ready for use by 1988.

Do German computer architects and the data processing industry still have a chance to play a serious role in the international supercomputing game? The SUPRENUM project has set this goal for itself by incorporating three developments:

- Supercomputing--the immense demand for high-speed computer performance in a number of disciplines involving the natural sciences, engineering and technology.
- Parallel computing--challenging the information processing sector (hardware and software) to increase computer speeds many times over by using several processors working together in parallel within one system.
- Multilevel computing--the basic use of new algorithms with regard to numerical principles which permit spectacular increases in efficiency over standard algorithms.

MIMD Architecture

The project came into being based on these three developments, as represented by the three groups--users, computer scientists, mathematicians. Its chances for success depend on combining these three developments and converting them into a single computer architecture. Accordingly, the SUPRENUM computer is designed such that increases in speed produced by multiple processors and multilevel algorithms are multiplied whenever possible.

The project's inception in 1985 was preceded by a definition phase lasting more than one year in which ideas were gathered, concepts were formed and project partners were selected. Following lengthy discussions among the groups involved, the unanimous decision during the definition phase of the project was in favor of the MIMD type of architecture. This encompasses multiple-processor architectures in which the distributed processors work autonomously rather than being subordinate to a central instruction processor (SIMD principle). Current supercomputers are nearly all SIMD machines, mostly using the sophisticated pipelining method of vector processing which has nearly reached the limits of achievable speed.

The advantage held by the large manufacturers (CDC, Cray, Fujitsu, etc.) in this area today cannot be overcome with one development project such as that represented by the SUPRENUM concept. In the MIMD sector, on the other hand, the advantage which other research institutions and manufacturers may have is not insurmountably large. There are no universally accepted solutions to date for many basic problems in the construction, operation and application of MIMD computers. Commercial systems are only now appearing on the market.

While additional increases in speed would be very difficult to achieve in the SIMD area--based on processor technology available now or in the near future--the number of parallel operations and thus the speed of MIMD machines, in which each processor has access to its own complete memory, is virtually unlimited if sufficiently large numbers of processors are used. Limits are placed on the system by inter-processor communications requirements, but these vary greatly depending on the application involved.

High-speed vector computers now on the market are by their very nature general purpose (numerical) computers which scarcely allow the specific characteristics of certain types of applications to be utilized (at most indirecty--using standard vector lengths or the like). With MIMD architectures, on the other hand, it is possible and even technically

necessary that the communications structure which is characteristic of the algorithms in question be recreated in the processor topology.

The goal of this project therefore is to realize a processor topology which is designed for the types of applications and algorithms envisioned and which supports the communications structure required by this field of applications as efficiently as possible.

On the one hand, there are numerous tasks for which a numerical solution would require computer speeds on the order of one (or more) times greater than what is available today, while on the other hand, solving these problems could mean significant progress in terms of technological developments or fundamental knowledge. Such problems are encountered in fluid mechanics, meteorology, many-particle physics, plasma physics, elementary particle physics, geology, microelectronics and many other disciplines.

Local Grid Structures in Applications

Although the tasks to be performed come from a broad spectrum of scientific and technical fields and sometimes appear to be widely divergent, a very large group of these tasks is characterized by a remarkably uniform basic structure both mathematically and in terms of "information." Tasks are characterized by their localness with respect to grid structures. Large-scale equation systems are typically solved using these grid structures. The size of the system involved can be considerable: Solving for one million unknowns is not uncommon, and problems with a billion unknowns may even be processed in many cases. Such tasks always result when partial differential equations are broken down into discrete elements, but also in conjunction with other models--with natural grid structures in many-particle physics, for example.

The local nature of the above-mentioned problems which SUPRENUM is primarily intended to solve, also suggests the use of "local" processes to begin with. In such processes, the operations to be performed for the most part link nearest-neighbor quantities to one another (within the given grid structure).

Superfast Algorithms According to the Multiple-Grid Principle

Extraordinary increases in efficiency in the area of algorithms have been achieved in the past few years through the use of new numerical principles. The multilevel principle (multiple-grid principle) plays a prominent role in terms of the grid problems involved here. This principle has very general applications.

From the beginning of the project on (deliberations concerning the definition phase) and during all of the planning work, the declared objective of SUPRENUM's development was that the SUPRENUM architecture would support the multiple-grid principle: There was and is agreement that the development of a computer for grid problems is pointless if the computer does not take advantage of the progress achieved by the multiple-grid principle. Theoretical work during the definition phase of the project therefore dealt

First of all with the question of mapping: multiple-grid principle--computer architecture (compatibility, support, optimization).

The First Step: SUPRENUM 1

All of the project partners and experts agree that a high-speed SUPRENUM computer should not be realized all in one step. Therefore, a high-speed MIMD computer will be produced first within the SUPRENUM 1 subproject; this computer will have the architectural properties needed for the applications and algorithms envisioned and will be able to be constructed relatively quickly from available components.

Based on the theoretical studies of the relationship between the multiple-grid principle and computer architecture, the decision made was in favor of a concept by Dr Wolfgang K. Giloi, head of the GMD-Forschungszentrum fuer Innovative Rechnersysteme und -technologie:

- MIMD computer comprising p single-board network node computers connected by a two-stage bus system
- Network node computer with its own memory, 32/64-bit MC 68020 microprocessor, fast floating-point co-processor with vector processing (Weitek 2264/65)
- Bus connecting (up to) 16 nodes each to form a cluster
- 2D array of SUPRENUM busses (horizontal and vertical bus connections) at cluster level, based on the UPPER ring bus
- Overall computer system comprising the computer clusters, one programming computer, one operating system computer and one maintenance computer (in each case the MPR 2300).

UNIX will be the operating system. Plans are for the concurrent use of MODULA 2 and FORTRAN which has been expanded by the addition of MIMD constructs as the programming languages. Communication among the processors will be in the form of message passing.

A prototype with $p = 256 = 4 \times 4 \times 16$ nodes, as well as five smaller development systems are expected to be functional and able to be put into use by 1988. Developing these computers and providing them with systems and numerical applications software is the purpose of the SUPRENUM 1 subproject. These computers, in terms of both the hardware capability provided and the applications software, are attractive pieces of equipment for the typical large-scale user of numerical applications. Moreover, they should make it possible, using realistic numerical problems (not just elementary logarithms or modeling tasks), to gain experience in programming and manipulating MIMD structures.

Work on SUPRENUM's long-term high-speed objective is being carried out within the SUPRENUM 2 subproject. Typical SUPRENUM 2 activities include the following:

- In the area of applications software: Expanding the core applications and algorithmic service classes to include complex and dynamic grid structures;

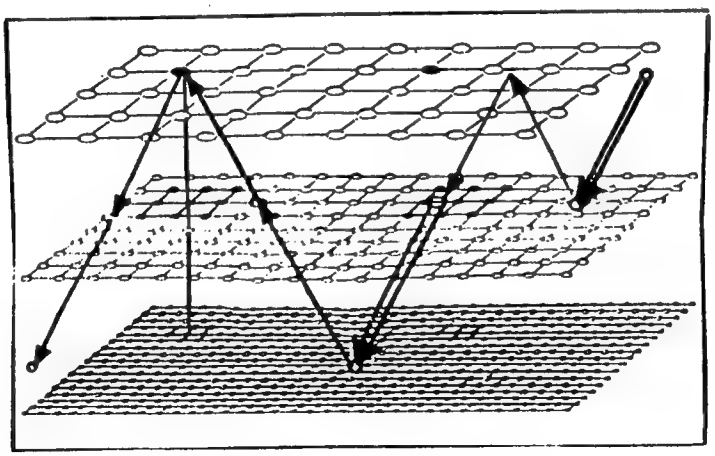
data-dependent adaptive procedures, irregular and highly dimensional grids, Monte Carlo methods based on grid structures, non-grid applications, etc.
- At the language level: Including innovative language concepts which support automatic load distribution (particularly with dynamic grid structures) to the multiple-processor structure.
- In the systems area: Investigating alternative interconnecting structures (other topologies, variable interconnection networks) in particular with regard to dynamic grid structures and automatic load distribution strategies, new processor technologies (VLSI, GaAs and so on).

The Partners and the Division of Labor

The initiative for SUPRENUM goes back to the activities of the working group of the large-scale research establishments which voiced concern about the acute need of many large-scale research establishments for fast numerical methods and innovative computer structures. Consequently, several large-scale research establishments are now involved in a major way in the project. The work is divided into three areas: applications software, language level and system (operating system and hardware). The establishments involved are:

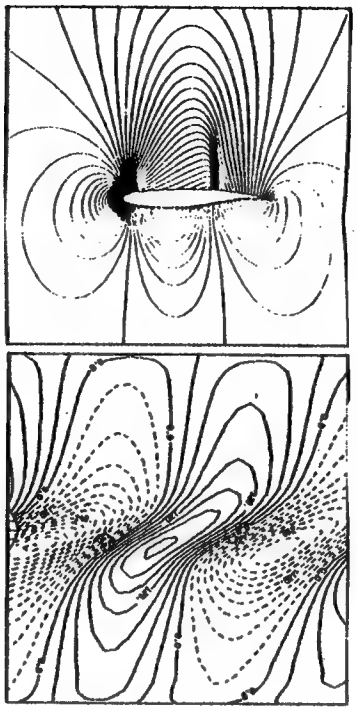
- In the applications software area: The DFVLR, Dornier GmbH, the Gesellschaft fuer Mathematik und Datenverarbeitung mbH (GMD), the Kernforschungsanlage Juelich GmbH (KFA), the Kernforschungsanlage Karlsruhe GmbH (KfK), Kraftwerk Union AG and the University of Duesseldorf.
- In the language level area: GMD, the Technical University at Darmstadt and the University of Bonn.
- In the systems area: GMD, Krupp Atlas Elektronik GmbH, Stollmann GmbH, the Technical University at Brunswick and the University of Erlangen-Nuremberg.

The main partners, GMD, Krupp Atlas Elektronik GmbH and Stollmann GmbH founded SUPRENUM GmbH to implement the project. The project management will now be installed at SUPRENUM GmbH and will engage in research and development and later take on the responsibility for marketing the computer.



The SUPRENUM computer is based on the "multilevel principle." Local relationships and grid structures characterize a large number of technical applications; for the most part these are discrete partial differential

equations with large but sparsely populated equation systems (10^6 to 10^9 unknowns). The multilevel principle now permits a sensational increase in efficiency over standard algorithms. Using multiple-grid processes, the individual steps can be solved in optimum fashion by the SUPRENUM architecture. The calculations are frequently made on the coarser grids.



The demand for high-speed computers for numerical simulations is continuously increasing today specifically in the disciplines of the natural sciences and engineering. Calculating the flow around an airfoil (top picture), for example, or representing air flow over a model of a mountain range (bottom picture) requires a "computer of the highest quality." MIMD architecture, used in this form uniquely by the SUPRENUM computer, is intended to make this level of performance available. The consortium of research establishments wants to achieve this increased performance by means of a multiple-processor computer which uses multilevel computing. Whenever possible these two design principles should multiply the increased performance achieved by two known architectures to date.

12552
CSO: 3698/280

CNES IMAGE PROCESSING SOFTWARE, HARDWARE DESCRIBED

Toulouse CENTRE NATIONAL D'ETUDES SPATIALES in French (no date given) pp 343-352

[Article by A. Mangin, Centre National d'Etudes Spatiales, Centre Spatiale de TOULOUSE, Division Traitement de l'Image, 18, Avenue Edouard Belin, 31055 TOULOUSE]

[Text] ABSTRACT

This paper describes the concept of a system which will be used at CNES as of 1985 for remote-sensing, image-processing activities. The first part describes the essential constraints which result from the mission of the system and which influence the organization options adopted. The second part describes this organization by emphasizing the essential points which satisfy those constraints.

1. GOALS OF THE IMAGE PROCESSING SYSTEM

At the approach of the launching of the SPOT satellite, CNES decided to equip itself with an image processing system which will allow it to maintain and develop the actions engaged in the field of promoting remote sensing activities in space.

The system will be operated concurrently by users of CNES and by users of outside laboratories working in more or less close collaboration with CNES on remote sensing subjects. The first mission of the system is to satisfy the needs expressed by these users. The second mission is industry oriented: a range of image processing systems can be established on the basis of this first application in order to be associated with the list of "ground" equipment means which will be offered to the users of remote sensing data, particularly on the export markets.

The purpose of this paper is to present the principal organization principles of this system.

2. CONCEPTUAL CONSTRAINTS OF THE SYSTEM

2.1 Various Operating Contexts

The system will be used in a research framework as in a production framework, particularly at the time of demonstration or validation phases of the remote sensing process. In the first case, there must be available a system offering

a powerful interactivity, a very flexible operator communication capable of suiting any user category, and very large program development facilities so as to permit the application and the validation of new algorithms. In the other case, although the interactivity requirements are much more limited, it is nevertheless necessary to provide greater processing power.

2.2 Users

Communication between the users and the system is a difficult problem: not all of the users have the same experience with the system, their level of competency in data processing is very variable, and not all have the same use of the system. The concept of the communication with the user should take these differences into account so as to provide graduated access levels to the system depending upon the user: and similarly the program development facilities should be structured accordingly.

2.3 Image Data

The first problem to be resolved is the amount of data to be managed; in the case of remote sensing images this amount is often considerable: a rectified SPOT scene, in panchromatic mode, occupies an average of 50 million octets; and a Landsat Thematic Mapper scene counts 240 million octets. In addition to this already delicate problem involving volume, the satellite scene consists of a complex entity which mixes image data and auxiliary data, such as identification data, calibration data, picture-taking parameters, etc.

Finally, the processing of remote sensing data is not limited solely to the handling of image data supplied by satellites or aircraft campaigns; the cartographer includes in his work data from such very diverse sources as land measurements, zone limits, previous processing results, etc.

The designer of the image processing system is therefore confronted with a significant quantitative problem of data to be managed, aggravated by the diversity of the types of data encountered and the necessity of being able to cross these data among themselves.

2.4 Design Requirements and Qualities of the System

In order to satisfy the previously mentioned constraints and particularly to provide a system that can be adapted to both a research-type operating context and a production-type context, it is imperative that this system satisfy certain requirements as follows:

(a) capacity of processing the images independently of their size;

(b) no limitation of the system with regard to certain types of images: on the contrary, the system should be capable of processing all the known formats of remote sensing data. Furthermore, it should be possible to adapt the system to any new format offered by the image producers;

(c) the increase of computing power of the system, by recourse to specialized computing processors, should be transparent for the user at the level of the processing function calls;

(d) graduation of the accesses to the system in function of the various user categories. Similarly, the assistance that can be optionally provided to these users should be graduated accordingly; and

(e) very large program development facilities to allow users to code their own processing functions.

The management of the image data constitutes a delicate problem which requires thorough study: in particular, it is necessary to avoid processing methods that are specialized in function of a definite type of data when no requirement justifies them. Hence, this study calls for a standardization effort for the various groups of data--the objects--handled by the processing softwares. But satisfying this standardization goal implies that a compromise must be established on the image processing system between requirements that are often contradictory, such as:

(a) necessity to take into account all of the data needed by the cartographer;

(b) ease of designation and handling by the user;

(c) simplicity of the forms that allow defining the processing organization of the objects with a reduced number of parameters; and

(d) possibility of structuring the organization of the data in view of improving the efficiency of algorithm processing.

The quality of service provided by the installed system, and consequently its success, depends in part on the result of this standardization effort involving the image processing data and the quality of the management software design that followed.

3. DESIGN OF THE IMAGE PROCESSING SYSTEM

3.1 General Characteristics

The system built in response to the previously described requirements is of the multifunction-multiuser type. The basic idea is to establish a central core, the processing computer, around which specialized work stations are connected, called shops, and which provide, by operating more or less independently of the processing computer, such work as image visualization and handling, data packaging for application on image plotters, etc.

The link between the processing computer and these shops is given by a single command language, irrespective of the work station, the communications between processors being rendered transparent for the users.

3.2 "Software" Architecture

The most complex architecture is that of the processing computer designed for operation in a multiuser context. The architecture of the specialized shops is generally simpler, almost always of the monouser type, but the organization principles are patterned directly after those utilized on the processing computer. These architecture principles are stated below.

3.2.1 User Access: User access is based on the services of a command language interpreter. This interpreted language has a syntax approaching that of PASCAL. In addition, it has special facilities which have been very widely used in the construction of this image processing system:

a) Syntax analysis statements which allow the user to write new commands in the syntax of his choice;

b) Communication and synchronization tools which perform in parallel with the command language interpreter; and

c) Screen management which permits communicating with the operator by means of menu displays.

All of these statements were used to write the highest level commands of the image processing system: these commands are established in a simple syntax approaching natural language and are based on a very limited number of key words. Overall, these commands permit designating and applying all of the system functions, without exception. In addition to this communication service, the user access includes the following other services:

a. Help Functions in Operating the System

1) By means of specialized function keys for entering a HELP command, the user can be helped by the system at any time, either for the designation of a command or for entering parameters which complete the command. Since the parameters are assembled by coherent groups, the latter can be entered directly by the user if the syntax of this command is known. They can also be designated by means of pre-established menus, with writing of values by default that the user has the possibility of modifying by interactive communication.

2) The system manages, in parallel, a record which memorizes all of the commands entered by the user and the responses given by the system.

3) Finally, all of the commands and command parameters are recorded on files. During a work session the user thus has the possibility to think about the work already undertaken, to change certain commands, or to modify parameters and have the system repeat this set of commands as many times as required.

Furthermore, such blocks of commands can be executed either in an interactive communication context with the user or also in an execution context of the batch processing type.

b. Help Functions for Development of New Functions

The user of the system has specialized software at hand, called program frames, which take into account all of the image-data access logistics either for performing point-by-point processing in the images or for processing point windows in these images. The user then merely has to code the specific software which applies its processing algorithm, after which it is sufficient to conform to the simple interface rules which allow integrating these specific software programs into the program frames.

In a manner entirely similar to that of writing new processing functions, the user can again be helped in the writing of new commands which will be recognized by the command language interpreter. The commands written by the user can either be completely new commands or characteristic sequences of existing commands or even a combination of the two preceding possibilities.

3.2.2 Data Management: The corresponding software layer is intended to standardize the image-data access procedures so as to make these accesses independent from the configuration of the image processing system as well as from the original format of the data.

In order to obtain this independence among the applications and the original formats, the image processing data were assembled within the system in a voluntarily very limited number of objects which define the only data categories permitted in the processing software. The image objects thus defined allow handling of the following:

a) Image data stored as a succession of image lines or as a sequential series of rectangular blocks cut on the image;

b) Digital arrays where the stored data is accessible in direct access mode; and

c) Structured parameter series, called parameter lists, where each named field of a list is itself also directly accessible.

A service software was developed following this structuring of the image object data. It accomplishes the centralization of the management and access tools and offers the following services to the user:

a) It performs a management repertory which allows referencing all of the image objects stored in the system;

b) It checks the access to the objects and settles sharing conflicts; and

c) It provides access to the objects. In the case of image data, this software ensures, as options, functions such as window-type access (rectangular blocks cut on the image), sampling, decompression on the pixels when they are not stored on octets or multiples of octets, etc.

Parallelling the image-object management software, the user is provided with a data base on the image processing system. The purpose of this base is to place the various forms of handled data into relation, such as point-to-point image data (raster mode), vectorial-type data, tabulated data, etc.

Among these various data, the base links several types of relations:

a) Appurtenant Relations: Assembly of data by categories, by geographical place, etc.;

b) Association Relations: Image associations and auxiliary data, etc.; and

c) Affiliation Relations: Links between original images and images resulting from processing, identification of manufacturing processes, etc.

The data base thus created will be operated within the framwork of special remote sensing applications where access to data is effected precedentially according to geographic localization criteria, followed then by criteria linked to the theme under consideration, to the cartography, to the types of data, and to the picture-taking dates.

The set thus created, i.e., image-object management software and data base, has a sufficiently general structure so as to be adaptable to configuration evolutions as well as accommodation of new data.

3.2.3 Image Processing Functions: From the user standpoint, the system appears like a language allowing application of operators to objects. The check operators which act on the nature of the objects (creation, destruction, etc.) are orders processed directly by the data manager. The processing operators which act on the data contained in the objects (application of the image processing algorithms) consist of specific software whose performance is commanded by the command language interpreter and which performs in parallel with it.

The command interpreter, plus the set of image processing software commanded by the user through the interpreter, gives the software context of the user; the multiplicyt of these contexts as many times as there are active users on the system describes the overall context of the system within a framework of multiuser operation. The management software of the objects settles the object sharing conflicts which may appear among users. The other conflicts which may appear among users in the sharing of the other resources of the system are resolved by a specialized software called system supervisor.

The various categories of image processing functions offered on the system are as follows:

a) Input/Output Function: Data readout in practically all of the known tape formats, saving and restoring, etc.;

b) Preprocessing: Calibration, geometric corrections, etc.;

c) Statistical analysis;

d) Combination of channels and segmentation;

e) Classification and filtering; and

f) Utilities: Image handling and visualization.

Because of the help tools in the development of programs, the list of these functions inside each of these categories is not limited; and each user is free to extend it at his convenience.

3.3 "Equipment" Architecture

3.3.1 Present Configuration: The image processing system is built around a processing computer consisting of a VAX 780 with a 6-Moctet memory capacity.

The magnetic units, disks, and magnetic tape units are connected directly on this computer; the storage capacity reaches 1.4 Goctets.

The processing capacity of the system is extended by the addition of a specialized computing processor (FPS Model 5205).

A great number of work stations consisting of graphic or semi-graphic communication consoles and a PERICOLOR 2000 image visualization console supplied by Societe NUMELEC are available to the users of the system.

Special peripherals are also connected to the system, i.e., video-camera image digitizer, plotting table, image printer on paper support for restoring black and white or color images.

3.3.2 Extension of the System: The policy of installing specialized shops began by the connection of a PERICOLOR 2000 image console which functions in semi-autonomous mode with respect to the processing computer. It is going to be developed in 1985; the following shops are already under design or are even being installed:

a) New image handling and visualization shops.

b) Geometric shop which will constitute an optimized work station performing the following tasks: taking bearing points on cards and on images, computing deformation models of the images, and applying geometric rectification work on the images.

c) Image storage shop based on the use of digitized optical disks.

d) Image restoration shop which will take charge of the overall needs of the users, whether it is a matter of restoring on film support or on paper support.

Other shops are contemplated in a future phase, in particular:

a) An on-line data service which will manage the totality of the storage means on magnetic supports for all of the system shops; and

b) A support conversion shop which will be specially charged with entering image data into the system and forming the resultant data produced by the processing.

All of these shops should comply with the software organization principles stated in the preceding chapter. The communications between shops will be established by exchanges via a means of the local-area-network-type at very high speed. This point will be the subject of one of the systems concept studies which will be developed in 1985.

4. APPLICATION AND AVAILABILITY OF THE SYSTEM

The construction of the image processing system discussed in this paper was awarded to the Societe Europeenne de Propulsion (SEP) which previously completed the acquisition and processing ground segment of the SPOT satellite images.

The system will be installed in the first part of 1985 and will participate first of all in the acceptance work involving the radiometric and geometric quality of the SPOT images.

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13112/9869
CSO: 3698/A196

STATUS, PROGRESS IN FRG SENSOR R&D DETAILED

Duesseldorf VDI NACHRICHTEN in German 13 Feb 87 p 22

[Text] Berlin, 13 Feb 87 (VDI-N)--For the 1985 to 1988 period, the Microperipherics Aid Program by the Ministry for Research and Technology [BMFT] is being afforded a total budget of DM 400 million; of this, DM 20.6 million is set aside for chemical sensors. In keeping with the principle of support for cooperative projects, VDI/VDE-Informationstechnik GmbH held a status seminar in mid-January in Berlin. The general situation and progress in the area of chemical sensors were discussed.

Before the approximately 80 participants in the status seminar, of which around 60 percent were from industry, the manager of VDI/VDE-Informationstechnik GmbH, Klaus-Peter Friebe, emphasized the goal of the assistance program: In the coming 3 years, chemical sensors should undergo as much development as microelectronic components. He reminded the group of the differences in innovation management, technical management and production management and of the difficulties in planning the particularly important area of innovation management. In his experience, approximately 80 percent of German industry focuses predominantly on production management. However, he said, awareness of the importance of meaningful cooperation between the financial world and technology is on the rise.

Friedrich Bornikoel of the BMFT provided the participants with information on the methods and goals of the assistance to cooperative efforts, of which there are currently over 200 under way. He said that its goal is an expansion of the technological foundation in a manner that is as competitively neutral as possible, and a strengthening of the infrastructure, especially among the institutes active in the respective fields. According to Bornikoel, one critical bottleneck is the too small number of experts, which can only be compensated for by close cooperation between institutes and industry.

In order to overcome the personnel bottleneck, Bornikoel recommended that specialists go into industry after 5 or 6 years at an institute and there make use of an institute-industry dialogue that had been initiated at an early stage. In this way, he said, synergetic effects can be expected, even if such plans have to be set up for the long term.

Despite the tedious development process, including that in the area of chemical sensors, Bornikoel said that the first important results are already in, and that they stand up well in an international comparison.

In an overview of sensor principles, market trends and the latest testing techniques, Dr. Wolfgang Goepel of the University of Tuebingen named around one dozen important fields of application for chemical sensors. This often decisively involves the migration, exchange and transport of ions, while many scientists today turn their attention instead to electronic problems.

Miniaturization Is Tackled Too Early

Goepel expressed regret at this distinction between market focus and primary research efforts, and questioned the logic of developing new principles before existing sensors are optimized. On the other hand, he said, there is often the tendency in the transfer of know-how to go over too quickly to miniaturization before, for example, overall drift problems have been studied sufficiently and their effects have been rendered sufficiently reproducible. He said that there are problems not only in "microionics," but also with multisensors and in many important questions, such as that of a lambda probe for low operating temperatures.

For semiconductor physicists, charge exchange reactions are of particular interest in this area; however, they should be studied not only using monocrystal material, but with polycrystal material as well, Goepel said. This involves questions of transverse sensitivity--the sensitivity to substances or quantities other than the one actually under study--and the long-duration reproduciblility of the sensor function.

Substrate Material Cannot Be Involved in Sensor Reaction

Goepel pointed out that thick film sensors could in principle be less expensive than monocrystal or polycrystal sensors, although with an increasing number of layers it becomes increasingly difficult to overcome interdiffusion problems. Part of the question here revolves around which materials, and in particular which substrate materials, are actually inert, and thus are not involved in the desired reactions. This is only slightly the case with silicon dioxide, aluminum oxide is a little better and thorium oxide surpasses both, he said. Thus, according to Goepel, it is often necessary with chemical sensors to use technological tricks. For solid-state electrolytes, selective diffusion is used, he said, and it is then necessary to solve a three-phase problem.

Goepel described the coupling of microelectronics and organic chemistry as interesting; this would lead to molecular microelectronics. In many cases, the compromise between local resolution and sensitivity to detection is decisive for the success of a type of sensor. As an example, he mentioned the possibilities of disruptions and impurities in zinc oxide sensors, whereby at rising temperatures physical absorption (100 K to 400 K), chemical absorption (300 K to 700 K), surface defects beginning at 700 K and, finally, volume defects beginning at around 1300 K are to be taken into account.

12271
CSO: 3698/298

OFFICIAL EEC PROPOSAL ANNOUNCING SPRINT

Brussels COMMUNICATION FROM THE COMMISSION TO THE COUNCIL in English COM (86) 483 final 14 Oct 86 pp 2-21, annex 1, and annex 2

[Excerpts]

/Text/ 2.1 The plan for transnational development of the supporting infrastructure for innovation and technology transfer was adopted by the Council of Ministers on 25 November 1983 (Council Decision 83/624/EEC). It came into force on the day of its publication in the Official Journal of 15 December 1983. 10 Mecu was the amount deemed necessary for the implementation of the plan. Article 6 of the Decision provided that the Commission should be assisted in implementing the plan by a consultative committee, whose composition, duties and method of procedure were set out in Annex II of the Decision.

This committee was subsequently named the "Consultative Committee for Innovation and Technology Transfer" or "CIT".

2.2 The scope for the implementation of the plan was set out in Annex I of the Council Decision of 25 November 1983, which listed the precise areas in which concrete actions may be launched. The list is divided into three chapters. Each relates to a different aspect.

a) The first places the emphasis on "human" networks and networks of "organisations", the establishment or strengthening of liaison mechanisms to improve the spread of innovation throughout the Community and the propagation of technology transfer.

b) The second concerns the strengthening of the infrastructures which pave the way for the emergence of innovation and technology exchange. The accent is on the specific instruments aiding the dissemination of knowledge or the organisation of patent and licensing markets.

c) The third concentrates more particularly on concertation and exchange of experience between Member States.

2.3 After the inevitable initial adjustments, the first concrete actions were launched in Spring 1984. Two annual reports submitted to the Council, the Europen Parliament and the Economic and Social Committee in accordance with Article 6 of the Decision show the progress made in 1984 and 1985 (1) and give a detailed description of the actions launched. By the end of 1985, after consultation with CIT, the Commission had allocated approximately 7.65 Mecu of the original amount of 10 Mecu deemed necessary to these actions (2). In March 1986, the launching of five new actions brought the total allocated to about 9 Mecu. In view of the fact that other actions are planned and some of the actions in progress will be stepped up the original 10 Mecu ceiling will be reached before the current plan comes to an end in December 1986.

2.4 An analysis of the annual rate of allocation of appropriations (which for technical reasons is not immediately reflected as commitment of appropriations) is very revealing of the financial resources required for the implementation of the innovation plan. In 1984, the year in which the plan got under way, a total of approximately 2.5 Mecu was allocated. In 1985,

(1) For 1983-1984, see document COM(85) 274 (final) of 4.6.1985 and for 1984-1985 Annex II of the present document,

(2) See 2nd annual progress report, Annex II, page 3 (Annex II of the present document).

the year in which the carrying out of the work reached its cruising speed for the first time and the only "typical" year (if one can speak of a "typical" year over such a short period) a total of approximately 5.2 Mecu was allocated for concrete actions. During the first two years of implementation therefore, appropriations amounting to more than 75% of the original estimated total requirement had been allocated and at the beginning of 1986, the Commission could see no alternative but to curb its intiatives in favour of the transnational development of the supporting infrastructure for innovation. This was at the very time when two new Member States, both with specific needs in this field, were joining the Community. It had, in fact, less than 2.5 Mecu left for an entire year of implementation of the plan, whereas 1985 had shown that an annual commitment of 5 or 6 Mecu was needed for a Community of Ten.

The needs of a Community of Twelve can therefore be estimated by extrapolation at 6 to 7 Mecu per year, with a slight increase (1) in the scope of the plan but without increasing the rate of implementation or the intensity of the actions.

3. Implementation of the plan and evaluation of the actions in progress

Summary of actions:

3.1 The two annual progress reports mentioned above describe in detail the actions taken within the framework of the plan. In accordance with the objectives outlined in Annex I of the Council Decision, these actions were designed with particular regard to SMEs.

The development of SMEs through innovation and the introduction of new technologies depends not so much on direct aid as on the establishment of

(1) See 4.2 below

a favourable environment for this development. They require easy access to specialised advisory services on matters of finance, law, tax, technology, commerce and management.

SME managers, whose time is often fully occupied by day to day problems, need competent support in their approach to foreign markets, in their attempts to modernise or diversify, in the introduction of new processes, in the development of new products or services and in the acquisition or sale of technology. The first actions concentrated, therefore, in accordance with the guidelines in Chapter 1 of Annex I of the Decision, on establishing networks of specialist intermediaries, with the main aim of promoting innovation and technology transfer through transational cooperation between firms. Collaboration with firms in other countries can often enable an SME to expand the market for its innovations and thus to capitalise on them to the fullest possible extent.

Human networks of this kind have been set up by the Commission in the field of venture capital (in particular with the establishment of the European Venture Capital Association) and advisory services on technology and innovation management. Under this last heading, as well as the European Association for Technology Transfer, Innovation and Industrial Information (TII), which now has a membership of over 200 public and private organisations and firms and acts as an advisory service for SMEs on innovation, the support programme also includes specific cooperation agreements with advisory bodies in different countries (known as Action 1).

Approximately 50 transnational cooperation projects, involving 120 advisory bodies, were selected following the first two calls for proposals issued in the framework of this action. Community financial support was granted to them in so far as they undertook to implement a joint action programme intended to encourage SMEs, within their respective jurisdictions, to find partners in other countries, to help them find the most suitable firms for joint actions of various kinds and to help them in their efforts to acquire or sell technology. A third call for proposals, published in February 1986, should permit this action to be consolidated and extended to the new Member States.

These actions to promote "networks of intermediaries" are part of an overall strategy. They are supported by complementary actions (secondments of personnel from one advisory body to another, group visits, encouragement of collaboration on a European level at national technology fairs, a European pool of know-how for national design promotion organisations, transnational cooperation between industrial research associations, networks of experts for the rejuvenation of mature industries) all with the same aim:

that of bringing together on a European level all the economic agents involved in innovation and the spread of technology, i.e. not just the enterprises themselves but all those in a position to provide support.

In this way a network of intermediaries is gradually being built up in Europe, getting to know one another better, learning to compare their methods,and exchanging information and working very directly towards the spread of innovation in SMEs and technology transfer between European firms.

A total of more than 1000 different bodies are involved in this process. Given that they are intermediaries whose role is to multiply the effect of Community action, the impact in real terms on firms is much greater.

3.2 Apart from these actions to promote intermediaries, particularly in connection with SMEs, the Commission initiatives in the implementation of Chapter 2 of the plan ("strengthening the foundations") aim to improve the general climate for innovation, favouring two factors which are often crucial: firstly, the germination of ideas and secondly, communication tools. The dissemination of knowledge and technological information on a Community-wide level is encouraged by:

- adding a European dimension to technology and information conferences;

- organising the systematic dissemination in the specialist professional press of summaries of public research reports (EuroTechAlert);

- organising the systematic compilation of information on technologies and markets which are not easily accessible;

- setting up a telefax network for the rapid transmission of information on the tecnological opportunities available;

- creating a computerized index for the comparison of national and European standards (Icone);

- specific actions in the context of Article 3, item 3 of the decision such as actions 24a and 24b aimed at developing innovation support infrastructures in Greece in order to enable her to participate fully in transnational projects.

3.3 In accordance with Chapter 3 of Annex I of the Council decision, views and experiences are exchanged regularly betwen Member States and the Community, either at plenary sessions of CIT or in ad-hoc working groups (the most recent of which was on the rejuvenation of mature industries) or permanent working groups (the latter includes the working groups on "Design" and "Innovation and Patents" set up in 1986). These exchanges between Member States have, among other things, enabled some of the actions launched to be assessed and proposals for new actions to be drawn up. An action is now also underway concerning the use of the results of public research or research financed by the public sector (Action 8). It involves a series of studies on national practices in this field and is preparatory to an examination of the possibilities of creating a suitable framework in Europe for the transnational dissemination and use of these results.

Assessment:

3.4 Items 3.1, 3.2 and 3.3 above give a brief summary of the main actions launched in implementation of the plan (for details, see the above-mentioned annual reports). Their relevance to the aims of the plan and their effectiveness in the field are assessed on two levels:

- continuously by the Commission departments responsible for the administration of the actions;

- by specific evaluation on a national level with the active participation, or at the very least the cooperation, of the national delegations to CIT.

3.5 With regard to the continuous assessment by the relevant Commission departments of actions under way, the analysis of the number of responses to each of the seven calls for proposals made in the period August 1984 to March 1985 reflects the favourable reception they were given by the various specialist branches to which they were sent:

- in response to three calls made for Action 1 (transnational cooperation between advisory bodies), a total of 230 proposals were submitted;

- in response to the three calls made for Action 4 (conferences), a total of 285 proposals were submitted;

- in response to the call made for Action 22 (technology fairs), a total of 78 proposals were submitted;

3.6 Action 1 (transnational cooperation between advisory bodies to promote the spread of innovation towards and the transfer of technology between SMEs), which has been allocated the largest sum so far (3.7 Mecu), was assessed at a seminar in October 1985 attended by more than 120 technology transfer experts from all over the Community. The main conclusions reached by this seminar were as follows (1):

(1) For the full text see the Newsletter "New Technologies and Innovation Policy", DG XIII, No 50 of January 1986.

- most of the bodies involved gained from participation in this action in that it gave them (or strengthened) a European dimension, enabling them to take advantage of the experience of their partner(s) and giving them the means to develop new activities for the benfit of their clients;

- the technology transfer process can sometimes involve a large number of phases, taking 8 to 18 months to complete;

- a number of technical and methodological instruments could be developed to give added support to the advisory bodies involved in this action;

- the action has already resulted in an unmistakeable increase of awareness in the professional branches involved and they in turn are beginning to generate further interest.

The reports sent to the Commission by the contractors, on average every three months, and the follow-up of contracts carried out by the Commission staff, often involving on-the-spot visits, have confirmed these conclusions and shown that there is an increased awareness and mobilisation of interest in Europe. The analyses have also revealed new areas where Community action is needed (technology fairs, industrial research associations, training of technology transfer experts).

However, it is clear that to fulfill their maximum potential, Action 1 and its associated actions must be able to reach a critical mass, which they have not yet done, and that their continuity must be guaranteed.

3.7 Specific assessment on a national level (action 21) is still in progress, but even at this stage a number of comments can be made:

- as regards action 1 and associated actions, bodies should be chosen with extreme care, on the basis not just of their own abilities but also of the size of their clientele, in order to make the most of their role as "multipliers" of Comunity action;

- to strengthen the "networks" aspect, certain geographical gaps need to be filled, particularly in the peripheral regions, and it is desirable to avoid saturating border regions already more naturally predisposed towards transnational cooperation (in France, for example, the regions of the South West and West are under-represented while in the North and East of the country the picture is quite the reverse);

- it would be preferable to avoid spreading the financial resources available too thinly, for example by encouraging transnational cooperation between regional groups of complementary bodies working on the implementation of the same programme;

- the administration of all the actions needs to be improved, in particular by improving follow-up in situ (this is difficult to achieve at present, because of the shortage of staff in the Commission departments involved in the implementation of the plan);

- national assessments have confirmed that the implementation of the plan is still incomplete in certain of the areas of action listed in Annex I of the Counil Decision (see 3.8 below) and have drawn attention to the total absence from this list of a field of action nonetheless very important for the improvement of the general innovation climate: the training of specialist consultants working (particularly small and medium-sized) enterprises in technology transfer and innovation management and financing (a solution is proposed in 4.2 below).

3.8 The implementation of the plan is not complete. The precise fields in which concrete actions could be undertaken, listed in detail in Annex I of the Council Decision, have not all been covered. This would, in fact, have been quite a challenge in view of the number of fields listed and the complexity of the problems they involve.

In addition, some of the priority actions for 1983 listed in Annex III of the decision (this list was extended in 1984 and brought up-to-date in 1985) were not completed for a number of reasons or were only touched on.

The Commission feels that a number of fields which are important for innovation and technology transfer still remain largely to be covered. These include:

- the role of local authorities (points 14 of Annex I and 1 of Annex III);

- market surveys and support for the assessment of new technologies (points 2.1a, 2.1d, 2.2 and 2.3a of Annex I and part of point 2 of Annex III);

- the research/industry interface (point 1.1 of Annex I);

- the concertation of Member States' and Community actions (Chapter 3 of Annex I and point 4 of Annex III) which has only just started in the fields of industrial design, intellectual property in connection with innovation and the rejuvenation of mature industries.

4. Conclusions: the plan - an unfinished work

4.1 The plan, as it stands at present, appears as a programme that has started well and proved highly effective both as a source of useful experience and as a series of pilot projects. However much remains to be done. The plan has enabled the Community to make tremendous strides in the fields of support for innovation and technology transfer but, if a number of the actions undertaken are to realise their full potential, continuity and scale are both crucial.

This is particularly true in the case of Action 1. This action needs to be a long-term project because the natural barriers to cooperation between bodies and firms, hard enough to overcome on a national level, are even more resistant on a transnational level. On the other hand, it has been possible to complete other actions of a different kind within a relatively short period, and, after setting the ball rolling, the Commission has been

or will be able to pull out, at least financially, once the projects have, or will become, able to run independantly, as in the case of EVCA and the telefax network.

Nonetheless, generally speaking, any programme to promote innovation and technology transfer must be reasonably long-term, reasonably ambitious and of a reasonable scale if it is to have credibility and effectiveness. Furthermore, in accordance with the guidelines for the new Framework Programme (see 1.7 above), the major Community research and development effort needs to be reinforced and developed with appropriate measures to ensure that better use is made of the results of public research, both national and Community, and to speed up technology transfer and the spread of innovation.

4.2 Moreover, in the light of the experience gained and of the discussions held in CIT, it is necessary to extend the list of fields for action given in Annex I of the Council Decision of 25 November 1983, by adding the training of specialist consultants working with (particularly small and medium-sized) enterprises, in technology transfer, innovation management (1) and the financing of innovation. This is vital if due attention is to be given to the needs of Member States with weaker infrastructures, in so far as these actions would not be eligible for aid from the European Social Fund.

This extension of the fields of action is designed to help lessen the disparity between Member States in their capacity for advising or suppporting enterprises, particularly SMEs, to promote the creation and development of innovative SMEs, and to contribute to the unification of the Common Market.(2)

(1) Including associated fields such as design management.
(2) This specific action will be run in close coordination with the implementation of the COMETT programme, which is much larger in that it covers the whole area of basic training in technology related fields.

5. Commission proposal - the SPRINT programme

5.1 The European Council over recent years has consistently underlined the importance of developing a Community policy to support the creation and development of SME's.
The Commission agreed a comprehensive action programme for SME's at the end of July 1986 which has been transmitted to the Council (1).
The SPRINT programme contributes to the Commissions' strategy for the strengthening of SME's in the Community.
In view of these considerations and convinced that there is a need to pursue the implementation of the plan over a longer period in order to give this programme as much scope as possible, to enable it to be as effective as it deserves, to ensure continuity in Community policy and to provide for the gradual and harmonious integration of Spain and Portugal into the policy, the Commission proposes that the present plan be extended for a period of two years, to the end of 1988, and that the scope for the fields of action listed in Annex I of the previous Decision be extended to include training as described in 4.2 above.

5.2 The Commission further proposes that the fields for priority action, the list of which, according to Annex I of Council Decision 83/624/EEC, is drawn up annually, should be redefined and fixed, in the interest of continuity in Community policy, for the whole period of the revised programme. Although the Commission considers that these new priorities should, in order to avoid any break in the carrying out of the work in hand, correspond largely to those already in force (cf. Commission Decision 85/480/EEC of 16 October 1985) (2), the Commission also proposes that the following priority actions be added (3):

(1) COM(86) 445 final 7 August 1986
(2) See the text in Annex A to the Second Annual Report in the annex to the present Communication.
(3) See the proposed text in annex to the draft Council decision in Annex I of the present document.

- the organisation of training activities for specialist consultants in technology transfer, innovation management (including related fields) and innovation financing who offer their services mainly to small and medium-sized enterprises;
- the setting up of liaison mechanisms between local authorities, since they can be active participants in the innovation process at local level and are in a position both to promote innovation through cooperation on procurement and to create a favourable environment for innovation within their areas;
- the organisation of transnational activities and the dissemination throughout the Community of innovation and technology transfer information relating to the use of the results of public R&D, analyses of future needs in the context of assessment of new technologies, and the research/industry interface;
- the role of innovation in the rejuvenation of mature industries.

On the other hand, in view of the succes obtained in the promotion of the establishment of liaison mechanisms between venture capital institutions, it no longer seems necessary to maintain this as a priority.(1)

5.3 The adoption of this measure, that is to say the fixing of priority actions for two years by the Council until the end of 1988, entails a modification of Annex II of the Decision of 25 November 1983 ("composition, attributes and method of procedure of the consulatative committee"), as CIT's opinion on the annual list of priorities, once fixed by the Council, would of course no longer be required (Article A.3 would thus be amended by the deletion of the reference to this list and Article F would be deleted).

(1) The planned Commission initiatives in the field of financial engineering will provide a suitable framework for the pursuance of work in this field.

5.4 In the light of the above, the Commission also proposes that the plan should be allocated a sum corresponding to the cruising speed refered to in 2.4 and taking into account both the enlargement of the Community and the updating of the list of priorities. It is proposed that the extra amount for the period of the extension should be 11 Mecu, corresponding to a transfer of 1.5 Mecu from Chapter 100 of the 1986 Budget and to commitment appropriations of 3 Mecu in 1987 and 6.5 Mecu in 1988 (1). Taking into account the enlargement of the Community, and inflation, these amounts do not represent an increase in the level of expenditure deemed necessary in the original Council Decision 83/624/EEC.

5.5 The Commission also proposes that the plan should henceforth be entitled: "Strategic Programme for INnovation and Technology Transfer - definition phase" or SPRINT.

The Commission intends, during the period covered by the extension, to fully evaluate the results obtained and the experience gained, over a period long enough to have been meaningful, with a view to developing proposals for a new five-year plan (1989-1994). The extension period will thus enable the Community to provide both for continuity and relevance in the programmes already under way and at the same time to make considered proposals for the long-term future of innovation support policy.

5.6 In conclusion, the Commission invites the Council (see draft Council Decision in Annex I of the present document) to adopt the decision to:

. extend the plan to 31.12.88;

(1) This lack of budgetary symmetry is due to the restrictions imposed in the preliminary draft budget for 1987. This is why it is necessary, in order to take account of the real needs described in 2.4 above, to plan for a higher amount in 1988. The negative effects of the lack of appropriations in 1987 will be lessened by the carrying over of appropriations from 1986 (those from Chapter 100).

- to lay down for the period of the extension an updated list of priority actions (Annex III of the original Council Decision) according to the Commission proposal (see Annex "Priority Actions" to the draft of the Council Dceision);

- revise Annex II;

- revise the amount deemed necessary for the implementation of the plan specified in Article 5 of the Decision of 25 November 1983, increasing it to 21 Mecu to take into acount account the situation as it is developing in the implementing of the plan, the enlargement of the Community, the two-year extension period and the updating of the priorities of the programme;

- adopt henceforth the title of SPRINT.

Annex I

COUNCIL DECISION

of.....1986

modifying Council Decision 83/624/EEC concerning a plan for the transnational development of the supporting infrastructure for innovation and technology transfer

(86/ /EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES

Having regard to the Treaty establishing the European Economic Community, and in particular Article 235 thereof;

Having regard to the Commission proposal;

Having regard to the opinion of the European Parliament;

Having regard to the opinion of the Economic and Social Committee;

whereas it is vital to the future of the Community, firstly, to improve the general environment for enterprises with a view to fostering their capacity for industrial innovation and commercial dynamism and, secondly, to ensure that the best use of the dimension afforded by the common market is made by the Member States and more particularly by the enterprises themselves, in order that they might develop in a competitive, unified and free market;

whereas at the meeting of the Heads of State or Government held in Luxembourg on 2 and 3 December 1985, the Community set itself the objective of strengthening the scientific and technological foundations of European industry and encouraging the development of its international competitivity, in particular by supporting small and medium-sized enterprises, in their technological research and development work and in their efforts to cooperate with one another;

whereas, while it is primarily for enterprises to introduce new technology and innovations, innovation and technology transfer can nevertheless be stimulated by suitable measures;

whereas the efforts already being made in the framework of the plan for the transnational development of the supporting infrastructure for innovation and technology transfer need to be continued and reinforced;

whereas the first two annual progress reports on the implementation of Council Decision 83/624/EEC (1) are encouraging;

(1) OJ n° L353 of 15.12.1983, p. 15

whereas efforts need to be made to facilitate the gradual and harmonious integration of the new Member States to enable them to take full advantage as soon as possible of the measures adopted and to participate in the work being done;

whereas the disparity between the levels of advice and support available to firms, particularly small and medium-sized enterprises, in the different Member States needs to be reduced by appropriate means such as training of specialists in technology transfer, in innovation management and financing;

whereas a full evaluation of the results obtained and the experience gained over a period long enough to have been meaningful is needed with view to preparing proposals for a new five-year programme for the transnational promotion of innovation and technology transfer (1989-1994);

whereas it would therefore be expedient to extend the plan to 31 December 1988 with the new title of "Strategic Programme for INnovation and Technology Transfer - definition phase" (SPRINT programme), and it would appropriate to fix an updated list of priority actions for the same period;

whereas it would be expedient to modify Council Decision 83/624/EEC in consequence;

has decided as follows:

Article 1

Council Decision 83/624/EEC is modified as follows:

1. The heading shall be replaced by the following text "concerning a strategic programme for innovation and technology transfer - definition phase (SPRINT programme)"

2. Article 5 shall henceforth read:
"Article 5. The revised programme is scheduled for the period 25 November 1986 to 31 December 1988. The amount deemed necessary for the implementation of the entire programme shall be 21 million ECU".

3. The last paragraph of the preamble to Annex I concerning the annual drawing up of a list of priority actions shall be deleted.

4. The following shall be added to Chapter 2 of Annex I of the Decision, paragraph 2.4:
"2.4. Development of basic and further training programmes for specialists in technology transfer and innovation management and financing".

5. The reference to the preparation of the annual list of priorities in Article A.3 of Annex II and Article F of the same annex shall be deleted.

Article 2

The priority actions for the duration of the revised programme are listed in annex to the present Decision.

Done at Brussels on 1986

For the Council

The President

ANNEX

PRIORITY ACTIONS

1. Support for the establishment and initial activities of liaison mechanisms between advisory bodies, particularly for small and medium-sized enterprises (SMEs).

2. Organisation of transnational activities and dissemination on a Community-wide scale of information concerning innovation and technology transfer, in particular.

   a) use of the results from research and development carried out in the public sector or financed by the public sector;

   b) collecting information on technology developed in certain regions of the world where access to information is difficult;

   c) initiatives to develop opportunities for cooperation between firms, particularly SMEs;

   d) supply and demand of transferable technologies, for example by means of data-bases, technology marts and technology fairs;

   e) impact of problems connected with industrial property on innovation;

   f) improvement of access to knowledge on technical standards and regulations;

   g) analyses of future needs in the context of the assessment of new technologies;

   h) research/industry interface;

   i) promotion of the role of innovation in the rejuvenation of mature industries.

3. Organisation of activities relating to the training of technology transfer specialists on the management and financing of innovation and related fields in firms, in particular small and medium-sized enterprises;

4. Establishment of liaison mechanisms between local authorities as agents in the innovation process, both as regards the possibility of fostering innovation through cooperation on procurement and their role in the creation of a favourable environment for innovation on a local level.

5. Within the framework of the Concultative Committee for Innovation and Technology Transfer and with a view to concertation between Member States, exchanges of information, experience and opinions on national and Community measures designed to promote innovation and technology transfer, on their effects and their efficiency. In this context, identification of new opportunities for transnational action and proposals for their realisation.

A N N E X II

PLAN FOR THE TRANSNATIONAL DEVELOPMENT OF THE SUPPORTING INFRASTRUCTURE FOR INNOVATION AND TECHNOLOGY TRANSFER

Council Decision

(83/624/EEC)

of 25 November 1983

Second annual progress report

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1. OVERVIEW

1.0 INTRODUCTION

1.0.0 This second annual report has been prepared for submission to the Council, the European Parliament and the Economic and Social Committee in accordance with Article 6 of the Council Decision (83/624/EEC) of 25 November 1983 (see OJ L353 of 15 December 1983).

1.0.1 In its decision of 25 November 1983 the Council entrusted the Commission with the implementation of a plan for the transnational development of the supporting infrastructure for innovation and technology transfer, to cover a period of three years at an estimated cost of 10 million ECU.

To assist the Commission in implementing this plan, the same decision also instituted the Consultative Committee on Innovation and Technology Transfer - CIT.

The annexes to the Council Decision contained an analysis of the scope of actions to be taken (Annex I) and the procedure to be followed for establishing the annual list of priority actions for the years other than 1983. (Annex II, paragraph F). In accordance with this procedure a draft list of priority actions for 1985 was discussed at the CIT meeting of 26 and 27 February. The amended list, which was unanimously approved by the Committee at its next meeting on 6 and 7 June 1985, was published in the Official Journal (see OJ No. L285 of 25 October 1985). According to article 1 of the Commission Decision 85/480/EEC of 16 October 1985, the list of priority actions for 1985 will remain in force in 1986 unless a new list of priority actions is established. This Commission Decision and the list of priority actions for 1985 - which is part of it - are reproduced in Annex A to this report.

1.0.2 The very late date of the Council Decision's publication (OJ No. L353 of 15.12.83) meant that the Plan could not be launched until January 1984. 1985 therefore constitutes the second full year of the programme's application and the underlying annual progress report is the second in its "genre".

With respect to the first annual progress report covering 1984, the Committee, in accordance with the terms of Paragraph A.2 of Annex II of the Council Decision (83/624/EEC), examined the report as adopted by the Commission (Com(85) 274 final of 3 June 1985) and took note of the initial encouraging results with respect to the implementation of the Plan.(1)

see Footnotes (1)

1.1. DESCRIPTION, CENTRAL IDEAS AND SUMMARY OF THE PLAN

1.1.1 Description of the Plan

During this second year the implementation of the Plan has reached its cruising speed, the working procedures have been run in, and the engine is now working smoothly.

However, the "engine" metaphor does not adequately reflect the complex reality of the Plan and the field it covers: that of biology is more appropriate. In fact the Plan, which falls under one of the seven basic lines of action the Commission proposes in the new Community Framework Programme of technological research and development (1987-1991), represents a first stage in the drawing up and implementation of a Community policy to support innovation and technology transfer. It provides a controlled environment for experiments, some of which are abandoned because they come to nothing or run up against unforeseen obstacles, while others seem more likely to succeed, assume greater importance and may subsequently, by a process of reproduction and splitting-off, generate independent programmes.

The following lessons have been learned from the first two years of the Plan:

- the originally planned duration (3 years) is too short: it should be extended by two years to allow for the fact that it was introduced gradually, to allow for the accession of Spain and Portugal, and to allow sufficient time to prepare a new 5-year programme on the basis of a thorough assessment of the actions already begun.

- This methodical assessment has already begun at both national (Action 21 of the Plan) and Community level, thanks to the monitoring procedures set up and to the discussions in the Consultative Committee for Innovation and Technology Transfer.
  The assessment has made it possible not only to single out the main aspects on which to concentrate and to streamline the implementation strategy (see below), but also to detect gaps in the programme, in particular as regards training and the financing of innovation.

- This is why the Commission is drawing up a draft communication to the Council and the Parliament containing the proposals toprolong the programme and to extend slightly its fields of application.

1.1.2 The central ideas of the Plan

The Plan is based on a number of central ideas or options which are not all mentioned explicitly in the Council Decision and which the experience gained has allowed to be singled out, corrected or reinforced.

1.1.2.1 Innovation is taken in its widest sense, without any particular sector being favoured. Those who drew up the Plan did not intend it as a synonym of invention or high technology, even if these two aspects do play an important role in the process of innovation. It is to be found in the distributive trades, service industries and traditional industries as well as in advanced-technology industries. Its social impact in improving conditions of life, in modifying patterns of employment, in reducing or sometimes increasing regional disparities is of paramount importance.
From an economic point of view Member States cannot maintain and increase their competitiveness unless innovation achieves wider penetration of their economies (i.e. by reaching as many regions as possible) and does so more rapidly (by overcoming the geographical, financial legal and social obstacles in its way, and by converting research results more quickly into products, processes or new services).

1.1.2.2 Technology transfer is also a more complex process than might appear from a misleading comparison with the transfer of goods or capital.

Whether vertical industry-oriented research or horizontal (e.g. cooperation between research centres, trading in licences between firms), it forms a natural part of innovation:
- vertical transfer is an integral part of the innovative process;
- horizontal transfer enables economies or firms, depending on where they stand, to take advantage of the technical abilities of others or to generate income from their own know-how.

The transnational cooperation in the field of technological development and marketing by firms, particularly SMEs, can make an important contribution to the spread of innovation and to the achievement of a Community-wide market.

1.1.2.3 SMEs need intermediary and advisory organizations. If SMEs are to flourish through innovation and the introduction of new technologies, what they need more than direct aid is the setting up of a favourable back-up environment. In order to develop, they must have easy access to specialized advisory bodies on financial, legal, tax, technological, commercial and management questions.

Since the heads of SMEs are often fully occupied by day-to-day problems, such firms really do need expert support in dealing with foreign markets, in modernizing or diversifying, in introducing new processes, and in acquiring or selling technologies.

This is all covered by the term "supporting infrastructure" for innovation and technology transfer.

1.1.2.4 Innovation and technology transfer cannot be achieved simply by passing laws

Neither innovation nor technology transfer can be imposed on firms, but they can increasingly be organized and stimulated by appropriate measures.

For instance, in the face of today's technological challenges and the scale of international competition, the Member States of the Community must try to reduce the time elapsing between inventions and the marketing of new commercially viable products. They must also make sure that the scope offered by the Common Market is used to the full. For this scope to be realized it is also necessary for free internal markets to be realized and for common policies on trade and competition to be adopted in the EC.

1.1.2.5 Personal contacts and the meeting of ideas

Innovation analysts point out that innovation is often the result of a change of location. Innovators are often people who, as the result of their professional ups and downs, have had to break with their original background and move to a new environment where they have had to adapt and compete.

Inventions are just as often the outcome of the work of technicians or engineers who, for one reason or another, have left their original discipline for a new field of exploration.

Innovation, therefore, is often the result of personal contacts and the meeting of ideas and disciplines.

1.1.3 An original strategy

The implementation of the Plan is thus based on two main ideas: the systematization of personal contacts on the one hand, and the organization of the meeting of ideas and information on the other.

1.1.3.1 Human networks

Thus, the first actions launched under this programme mainly involved setting up networks of specialist intermediaries and advisers with the aim, among other things, of promoting innovation and technology transfer by means of transnational cooperation between firms. For an SME, obtaining the support of firms in other countries is indeed a way of ensuring that its innovations penetrate other markets and thus of using them to greater advantage.

Such human networks have been set up by the Commission in the field of venture capital (launching of the European Venture Capital Association, trial introduction of a system of financial aid for the transnational syndication of venture capitalists, annual symposia

on financing innovation in SMEs) and in the field of advisory bodies on innovative technologies and the management of innovation (Chambers of Commerce, private consultants, innovation centres, regional development agencies, etc.).

Under the latter heading, in addition to the setting up of the TII Association (European Association for Technology Transfer, Innovation and Industrial Information), with a current membership of over 200 public or private bodies or firms which advise SMEs, there is the aid programme for cooperation between (typically two or three) advisory bodies in different countries.

Thus, about 50 cooperation projects involving 120 advisory bodies have been selected to encourage SMEs in their particular sector to seek European partners and to provide a back-up for such firms in their efforts to acquire or sell technologies.

This action to assist "advisory networks" is part of an overall strategy. It is accompanied by complementary actions (short and medium-term staff exchanges between advisory bodies, group visits, promotion of European cooperation between the various technology fairs held at regional or national level, pooling of know-how in the design field through exchanges between design promotion organisations in the Member States, etc.) which are all aimed at the same target: bringing together at transnational level all those involved in technology transfer and support for innovation.

Thus, a network of European advisers who are getting to know each other better and are learning to compare their methods and exchange their information is gradually being built up.

In all there are approximately 1000 different organizations or persons involved in this process.

1.1.3.2 Organizing the meeting of ideas and exchanges of information

This is being done in two ways:
a) directly, by specific actions under the programme;
b) indirectly, by the method used to prepare and conduct the actions.

a) The specific actions to assist the meeting of ideas and information fall into three categories:
   - the dissemination of technological knowledge and information at Community level by means of the following:
     * adding an European dimension to conferences on technologies and innovation (Action 4);
     * organizing the systematic dissemination, via specialist trade publications, of resumés of public research reports (Action 2 - EuroTechAlert);

* organizing the systematic collection of information on limited-access technologies and markets (Action 15);
* creating a computerized index for comparing national and European standards (Action 7 - Icone).

- the creation of rapid communication tools, such as a rapid transmission network for information on available technological opportunities (Telefax network - Action 18);

- exchanges of views and experience in the Committee, in accordance with Chapter 3 of Annex I to the Council Decision, during plenary meetings and meetings of the ad hoc Working Groups (Icone, EuroTechalert, licence trading, Japan, etc.) or Permanent Working Groups (design, industrial property and innovation, all launched or to be launched in 1986).

b) The method used to prepare and manage the actions is based on participation, i.e. on the use of a whole range of instruments which all involve active contributions by the groups concerned.

These instruments are not all systematically used for each action; more often than not they are involved, at one point or another, in one of the development stages of the projects.

The instruments in question are:
* the organization of a symposium or seminar: a general subject thus becomes the basis for participants to meet each other, exchange experience and hear what others have to say;

* pilot or demonstration projects: the effects of a particular planned measure can be tried out in real-life conditions without an irreversible decision having to be made;

* calls for proposals: when a specific field of action is identified, a call for proposals is launched as means of collecting suggestions, of obtaining at little cost a very good idea of the 'state of the art' in the particular field, and at the same time of mobilizing the available skills.

By thus drawing on the imagination and experience of the professionals concerned, we involve them in a collective creation process which they will help to put into effect in the field.

In conclusion, the innovation plan seeks to encourage and stimulate but not to intervene. It acts through intermediaries working with firms. In order to pursue its objectives (personal contacts and exchanges of ideas and information) it uses methods and instruments which put these basic ideas into practice. Thus innovation takes place both in the objectives and via the methods.

1.2 FINANCIAL EVALUATION AND PROSPECTS

The momentum that started to develop at the end of 1984 continued to increase during the whole of 1985 so that from several points of view the Commission together with the Committee have made, in 1985, substantial progress, with respect to furthering the implementation of the Council Decision:

- most of the Actions that received a favourable opinion from the Committee in 1984, were substantially further implemented, consolidated or extended in 1985.
- moreover a non-neglible number of new actions proposed by the Commission - all in line with the list of priority actions for 1985 and covering all the aspects of the Plan, particularly the ones calling for strengthening of the foundations and for concertation between the Member States - were examined by and received favourable opinions from the CIT.

In all, the Actions which received a favourable opinion from the CIT in 1985 will require Commission financing to the tune of 5.182.500 ECU (see Annex B to this report for a detailed breakdown).

Adding to that amount the 2 460 000 ECU that were or will be needed to finance the actions that were approved in 1984 one arrives at a total engagement of Commission funds of 7.642.500 ECU, to finance all the actions that were approved in 1984 and 1985.

By the end of 1985 the Commission had committed a total of 5.512.810 ECU - i.e 72 pct of the total engagement theoretically possible until then - of which 4.290.807 ECU in 1985. In other words, by the end of the year, all the appropriations for committment carried over from 1984 and a substantial part of the appropriations authorized for committment in 1985, had been committed. So the Commission has, in 1985, substantially reduced the backlog of appropriations for committment carried over from previous years, due to the late adaption of the Plan by the Council.

Under normal conditions the momentum and the rate of work that was achieved during 1985, especially during the second half, could be maintained during 1986. From an administrative standpoint the processes and structures set up by the Commission in 1985 allow commitments of 5 to 7 million ECU each year. So, 1986 will see the commitment of all remaining resources set aside by the budgetary authority initially for 1985 (4.5 million ECU).

The recruitment in 1986 of experts and the possible secondment of national civil servants will further ease the manpower shortage which although less prevalent at the end of 1985, has been an acute problem since the beginning of the implementation of the Plan.

Finally, due to the painstaking efforts of the Commission during the whole of 1984 and the beginning of 1985, some of the major barriers that hampered the implementation of the Plan in its first

year - notably the general problems experienced during the launch phase in setting up the CIT and the problems within the CIT caused by the different interpretation of some aspects of the Council Decision - gradually became less prevalent during 1985; to such an extent that by the end of the year a relatively smooth running clock-work within the CIT had been established making substantial progress in the implementation of the Council Decision possible.

2 IMPLEMENTATION OF THE PLAN

2.0 INTRODUCTION

Annex I of the Council Decision of 25 November 1983 details three major areas for action, namely:
- establishment of human networks and liaison mechanisms,
- strengthening the foundations,
- concertation of Member States and community action.

The Council Decision also calls for the annual drawing up of a list of priority actions. The list for 1985 (see Annex A to this report)contains four main priorities which together cover all three major areas for action: priorities 1 and 3 call for the establishment of liaison mechanisms respectively between technology and management advisory bodies and between organizations providing venture capital; priority 2 asks for structural improvements with respect to the dissemination on a Community wide scale of certain types of information concerning innovation and technology transfer and priority 4 calls for concertation within the CIT framework on action already taken or still to be taken at national or Community level in the field of innovation and technology transfer.

The Commission proposed, in 1985, with respect to each of these priorities several projects which together amounted to 19 proposals.
The CIT - which held in 1985 three plenary meetings on 26 and 27 February, on 6 and 7 June and on 7 and 8 November - studied all those 19 Commission proposals and gave a favourable opinion, before the end of 1985, on the implementation of 14 of them.

In consequence two calls for proposals were published by the Commission in the Official Journal of the European Communities (OJ No. C125 of 22 May 1985).

In addition, several meetings involving CIT members or experts nominated by the CIT were held on the following specific subjects:
- Evaluation of the proposals submitted for transnational cooperation between technology transfer and innovation services for small and medium sized enterprises, on 24 and 25 October (Action 1);
- Evaluation of the proposals submitted for organizing European conferences on technology and innovation, on 24 and 25 October (Action 4);

- "Innovation, Technology Transfer and Transnational cooperation between Small and Medium-sized Enterprises", seminar held in Luxembourg on 10 and 11 October in the context of Action 1;
- Eurotechalert: a European technology awareness scheme, on 4 June and 25 September (Action 2);
- Information on limited access technologies and markets (Japan), on 17 and 18 January and on 19 and 20 March (Action 15);
- Information on industrial standards (ICONE), on 17 January and 29 April (Action 7).

It was also decided to set up two working groups - one on Design and one on the Innovation Aspects of Patents - in order to foster concertation between the Member States within the framework of the CIT. These working groups were not convened until 1986.

In view of the above the Commission is pleased with the fruitful dialogue that has been established with the CIT and pays tribute to the quality of the analyses that were carried out as well as the suggestions that have been made by the national delegations with a view to improving the cooperation between the Member States themselves and between the Member States and the Commission.

Finally, as can be noticed from the column "Commitments" in Annex B to this report, the Commission has been able to carry out all the actions that were approved in 1984 except those involving STCELA.

2.1 "HUMAN NETWORKS" AND LIAISON MECHANISMS

In order to further the implementation of this first major area of action, called for in Annex I of the Council Decision, the Commission in conjunction with the Committee has in 1985 been active in three directions:

1) support for the establishment and initial activities of liaison mechanisms between advisory bodies on technology and management, particularly for small and medium-sized enterprises,
2) organization of activities designed to facilitate innovation financing and, in particular, continued support for liaison mechanisms between organizations financing venture capital,
3) the launching of cooperative design promotion projects jointly undertaken by design promotion organizations in the different Member States.

However, in 1985 it became also clear to the Commission that the Standing Technological Conference of European Local Authorities (STCELA) would, due to organizational problems, not be able to implement the Actions - approved in 1984 - that were designed to establish an interface between local authorities and innovative industries.

2.1.1 "Support for the establishment and initial activities of liaison mechanisms between advisory bodies on technology and management, particularly for small and medium-sized enterprises

The Commission has undertaken several activities with respect to supporting liaison mechanisms between technology and management advisory bodies for small and medium-sized enterprises. These activities - aimed at either furthering the implementation of the Actions that were already approved in 1984 or initiating new Actions in this context - covered:

- transnational cooperation between technology and management advisory organizations (Action 1),
- exploratory visits and professional secondments (Actions 5, 6 and 14),
- establishing contact points and organizing group visits for heads of SME's at technology fairs (Action 22),
- the European Association for the Transfer of Technology, Innovation and Industrial Information - TII (Action 13),

2.1.1.1 Transnational Cooperation between advisory organisations (Action 1)

One of the main aims of the Plan is the development of transnational cooperation between small and medium-sized enterprises, particularly in the field of technological exchange, in order to achieve a more rapid penetration of new products and services throughout the Community market.

To achieve this aim the Commission has placed particular reliance on public and private technology transfer and innovation management advisory services to small and medium-sized enterprises within the different Member States (e.g Chambers of Commerce, Regional Development Authorities, private technology and management consultants, etc.) and has endeavoured to establish transnational networks consisting of such advisory services. The intention is that these networks form lasting exchange systems, which will ultimately foster and facilitate transnational collaboration between small and medium-sized enterprises.

This Action, the implementation of which already successfully started in 1984, was in 1985 further implemented and consolidated in several ways:

a) The first actual transnational exchanges of technology that are directly attributable to the efforts of some of the 18 partnerships that were selected for partial Community support following the 1984 Call for Proposals for the promotion of transnational cooperation between technology and management advisory services (see OJ C210 of 10 August 1984) are starting - albeit slowly due to the complex nature of the process - to become reality.

b) Because of the widespread positive response to this first Call for Proposals the Commission asked for the extension of this Ac-

tion till the end of the Plan and for launching two additional similar Calls for Proposals - one in 1985 and one in 1986. The Committee gave, on 26 and 27 February, a favourable opinion on this request for a total amount of 2.7 million ECUs.

The second Call for Proposals (see OJ C125 of 22 May 1985) again met a widespread possitive response. A total of 70 complete proposals for cooperation were received involving 190 private and public technology and management advisory services. Of these 70 proposals 34 proposals were selected for partial Community funding totalling 1.565 MEcus. Thirty concerned completely new transnational collaborations involving 81 private and public advisory bodies for innovation and transfer of technology, spread all over the Community; the other four proposals were enlargements of existing collaborations to additional partners involving a total of 15 advisory services.

In conclusion and as a result of those first two Calls for Proposals in 1984 and 1985 a total of 47 transnational cooperations have been selected for partial Community funding, involving 120 private and public advisory services (see European maps in Annex C and see the OJ C40 of 21 February 1986 for the names and addresses of these advisory organisations as well as for the composition of each transnational cooperation).

c) A seminar on "Innovation, Technology Transfer and Transnational Cooperation between Small and Medium-Sized Enterprises" was held in Luxembourg on 10 and 11 October and brought together members of the Committee, Commission officials and 112 representatives of technology and management advisory bodies of whom 41 represented advisory services that were already cooperating as a result of the first Call for Proposals and 71 represented organizations that had submitted cooperation proposals in response to the second Call, issued in 1985.

This seminar - the aims of which were to take stock of work done under the first cooperation projects and to exchange experiences - produced valuable insights for all parties involved not only with respect to increasing the effectiveness of transnational cooperation schemes with a view to actually foster transfer of technology but also regarding the continuation of this Action on a broader and deeper basis, as was requested by all participants. With respect to increasing the effectiveness of transnational cooperation schemes the seminar emphasized the characteristics of advisory bodies - such as sufficient size, experience and staff - that have been successfull in this respect and the factors or conditions that in general have to be met by the cooperation for it to lead to transfer of technology between SME's.

2.1.1.2 Exploratory visits and professional secondments (Actions 5, 6, 14)

The Actions dealing with exploratory visits and professional secondments (i.e Actions 5,6 and 14) are intended to precede and to some extent prepare the ground for cooperation under Action 1 described in the preceding section. These Actions, which received already in 1984 a favourable opinion from the Committee, were further implemented in 1985 through the services of the European Association for the Transfer of Technologies, Innovation and Industrial Information - TII (see 2.1.1.4).

a) Exploratory visits (Action 5)

The aim of this Action is to permit industrial information transfer agents:

- to get to know each other as quickly and as efficiently as possible;
- to study working practices outside their own country;
- to explore the possibilities of transnational cooperation particularly in technology transfer; exchange of information; etc.

It involves the organization of three to four day visits of groups of maximum 20 industrial information transfer agents to relevant organizations in a particular Member State. These visits are open exclusively to agents working in another Member State than the one that is being visited. In 1985 four such visits actually took place: to Eindhoven (The Netherlands), to Udina-Venezia-Modena (Italy), to Berlin, and to Lyon-Grenoble (France) - each having about 10 participants.

For 1986 the European Association for the Transfer of Technologies, Innovation and Industrial Information - TII, which has been entrusted by the Commission with the management of this Action, has scheduled another four such visits: to Bristol/ Gloucester/ South Wales (United Kingdom), to Bilbao (Spain), to Ireland and to Portugal.

b) Short (Action 6) and medium term (Action 14) transnational professional secondments for information transfer agents

The aim of these actions is similar to that of the guided visits described under Action 5 above, though they are intended to go into the subject more deeply.

Action 6 is intended to enable an industrial information transfer agent, by means of a secondment lasting approximately 15 days, to become familiar with the working methods of an organization in another country and to establish the basis of permanent transnational cooperation in the form of personal contacts with colleagues of other nationalities.

In 1985, 18 of these two to three week secondments actually took place thereby establishing potentially lasting contacts between

advisory bodies from for example Southampton (UK) and Strasbourg (F), Munich (D) and Nancy (F), Valenzano (I) and Limerick (IRL), Lyons (F) and Rome (I), Brussels and Sheffield (UK), etc.

For 1986, TII, which since 1984 has been entrusted with the organization and management of this Action, also has planned another 34 such secondments. For 18 of these secondments the organizational details were completed by the end of 1985.

Action 14 is completely identical except for providing for rather longer secondments of up to three months. As up to now this Action has not generated a widespread response - due to the fact that many industrial information and technology transfer organizations find it difficult to miss the services of a member of their professional staff during a few months - the Commission is exploring ways of making this action more appealing.

2.1.1.3 Contact Points and Guided Visits at Technology Fairs (Action 22)

Although technology fairs can be important tools for promoting innovation and technology transfer, it has been observed that when entrepreneurs of SME's visit these events on their own, they are often overwhelmed by their size and by linguistic barriers. The objective of this Action is therefore to make visits by entrepreneurs and managers of SME's from one region in the Community to technology fairs in another region of the Community more productive by having an intermediary or advisory organization of the region of the visiting managers organize a "bridge" or contact point at that fair. Through this contact point, which will be responsible for overcoming possible linguistic problems and for preparing and organizing guided tours thereby taking into account the particular technological interests of the visiting managers, it should be possible for those visiting managers to make their visit to the fair as productive as possible in terms of initiating possible exchanges of technology.

This Action, the idea of which was born at a seminar called "A European Strategy for Technology Fairs", organized by the Commission in Luxembourg on 29 and 30 April 1985 and attended by about 40 organizers of European technology fairs was discussed by and received a favourable opinion from the Committee on 7 and 8 November. As a consequence a Call for Proposals for "the organization of group visits of entrepreneurs and managers from one Member State to technology fairs in another Member State" was prepared and published early 1986 (see OJ C33 of 13 February 1986).

2.1.1.4 The European Association for the Transfer of Technology, Innovation and Industrial Information - TII (Action 13) (2)

The Association - usually referred to as TII because of the simpler original version of its title - is a Luxembourg based non-profit making institution, founded in May 1984, whose main aims are:
- to stimulate innovation in industry;
- to promote transnational technological transfer and
- to encourage transnational cooperation between European companies.

During 1985, the Association's first full year of operation, TII has, despite limited manpower resources, been actively pursuing a number of activities all inspired by its main aims. These activities were:

a) Increasing its membership - from 90 members at the end of 1984 to more than 180 members at the end of 1985 - in order to create a Europe-wide network of persons engaged in transfer of technology and industrial information. The Association's membership, which covers all regions in the Community is very diverse, including university/industry liaison offices, private, public and semi-public consultants, Chambers of Commerce and Industry, etc. It has been compiled in a comprehensive directory - called WHO IS WHO IN TII - which was published by the end of 1985.

b) The publication of the first issues of TII-News, a bulletin designed to inform and assist TII members.

c) The organization of two international seminars: "The Opening of Universities to SME's (London) and "How to finance innovation in Europe" (Düsseldorf), the latter in collaboration with the European Venture Capital Association (EVCA) (see 2.1.2)

d) The creation of four working groups - each one chaired by a member of the TII Board of Management - whose objectives are to investigate ways to promote transfer of technology through improving the quality of TII services for its members. Since these working groups were created during the last quarter of 1985, they were able to meet only once in 1985, however with very encouraging results.

e) Analysis tending towards the establishment of an electronic communication system - called Eurotechlink - which is specially geared towards people involved in transfer of technology and which consists of a technology supply and demand database, a telefax network and an electronic mailing system.

See Footnotes (2)

f) The organization - under special contracts with the Commission- of exploratory visits, professional short-term and medium-term transnational secondments (see 2.1.1.2).

The above 1985 efforts were to a large extent financially possible through a Commission grant of 150 000 ECU for which the Committee had given a favourable opinion in 1984. As for 1986 the CIT gave on 7 and 8 November 1985 a favourable opinion on further support of 120 000 ECU.

While reviewing the 1986 working programme the Commission expressed the wish that TII in 1986 should streamline and intensify its activities, put special emphasis on developing relevant services for its members and, if necessary, adapt its managerial organization in order to achieve these objectives.

2.1.2 **"Organisation of activities designed to facilitate innovation financing and, in particular, continued support for liaison mechanisms between organizations financing venture capital"**

In 1985, just as in 1984, support was given to the European Venture Capital Association (EVCA), which is an international non-profit making organization under Belgian law with registered offices in Brussels(3). The aim of this association - according to Article 3 of its statutes is "to stimulate study and discussion of the management of and investment in venture capital within the European Economic Community with a view to developing and maintaining a venture capital industry as means to finance innovation and small and medium-sized enterprises with equity, and to establish high standards of business conduct and professional competence".

In 1985, which was the Association's second full year of operation, EVCA again managed to increase its membership substantially, namely by more than 50%, so that at the end of the year it had 130 members, spread over all Member States, of whom 71 were full members and 59 were associate members; in comparison, at the end of 1984 the association had 86 members of whom 52 were full members and 34 were associate members.

This membership increase is the result of the publicity programme that the Association vigorously carried out and which - at the request of the CIT - did give some special emphasis to those States where the Association's membership was relatively lagging behind. The most important elements of this programme were:
- the publication of a biweekly press review on the subject of venture capital (EVCA Press Review) and of a quarterly newsletter (EVCA Info) which also serves as a promotional publication for distribution to potential members;

See Footnotes (3)

- the organization of three seminars - respectively on Stock Options (Italy), Management Buy-Outs (Denmark), Venture Capital in Europe (Greece and organized at the request of and in cooperation with the Greek Secretariat-General on Research and Development) - and one symposium, entitled "The Changing Face of Venture Capital in Europe" (The Netherlands);
- the publication of its Membership Directory and of the guidebook "Raising Venture Capital in Europe", including the German version; several other translations eg. in French, Italian and Spanish are being considered.

In addition to the publicity program, the EVCA also started in 1985 - with a view to implementing Article 1.3c of Annex I of the Council Decision - a data collection and analysis system on innovation financing within the Community. This system - which will become fully operational in 1986 - will allow the EVCA:

a) to provide reliable statistics on sources and investments of venture capital - broken down by country and sector - which at present are lacking and which will significantly contribute to a better understanding of the venture capital market in Europe;

b) to measure the progress of innovation financing in Europe;

c) to publish the results of an annual survey on venture capital in Europe.

The above 1985 efforts were made to a large extent financially possible through a Community subsidy of 160 000 ECU - representing 44% of the Association's 1985 budget - which received a favourable opinion from the Committee on 9 November 1984.

As for 1986, the Committee gave on 7 and 8 November a favourable opinion for Community support of 100 000 ECU - which represents 22% of the Association's 1986 budget - and therefore is in line with the Commission's principle of progressive reduction of support. While reviewing the Association's 1986 working programme, the CIT - just as in 1984 - expressed the wish that the Association's activities should concentrate on canvassing for new members in those regions where it was currently poorly represented.

In 1985 the Commission also took the initiative, which was welcomed by the Committee, to mount a pilot project - called Venture Consort - that is intended to demonstrate that, despite differing financial, fiscal and company law requirements, innovative transnational projects and cooperative ventures between small and medium-sized enterprises can be financed at European level by consortia of venture capital companies from different Member States. This pilot-project was funded outside the Plan.

2.1.3 Launching of cooperative design promotion projects jointly undertaken by the design promotion organizations

While recognizing the fact that industrial design is playing an ever-increasing role in the development of new, competitive products, and thus in the process of innovation itself, the Commission also observed that:
- design as a skill has penetrated European industry to widely varying degrees;
- national design promotion organizations were at different stages of development and in some cases concentrated on too narrow a range of activities or on activities that were too far removed from industrial requirements.

The Commission therefore formulated a proposal for the launching of cooperative design promotion projects jointly undertaken by design promotion organizations in the different Member States. The Committee gave, on 7 and 8 November 1985, a favourable opinion on this proposal for an amount of 350 000 ECU. At the same time, following a suggestion by some Member States, the Committee also set up a Working Group to foster concertation on design between the Member States and to evaluate the joint cooperative design projects.

2.1.4 Standing Technological Conference of European Local Authorities - STCELA

The Standing Technological Conference of European Local Authorities (STCELA) is an international scientific association - as defined by the Belgian law of 25 October 1919, as amended by that of 6 December 1954 - whose members are the national associations representing the local authorities of the Member States of the European Communities.

In 1984, the Committee had given a favourable opinion for STCELA to carry out two feasibility studies: one on the publication of a specialized journal "New local government technology" (Action 10) and one on the establishment of an information service on pilot and demonstration projects using technologies of interest to local authorities (Action 11). It also had given a conditional favourable opinion on the first year's implementation of a project concerning local authority actions on household refuse treatment and vehicle flect management (Action 12).

Two of the conditions which the CIT - in conjunction with the Commission had attached were:
- the establishment of direct links between STCELA and individual local authorities, so that the latter would be fully informed on the activities of the Standing Technological Conference and would therefore be able to participate and benefit from it;
- the provision of guarantees that the organization was fully capable, also from a financial point of view - of carrying out the necessary work.

In 1985 it became clear that STCELA was unable to meet those conditions.

On the contrary, the STCELA Executive Board stated that the Association would require long-term permanent Community support and therefore rejected the request for becoming financially self-sufficient. Since by the end of 1985 the Commission had not received any details of the type of Community support STCELA desired, the CIT suggested the Commission to actively explore and investigate other ways of implementing article 1.4 of Annex I of the Council Decision that calls for the establishment of an interface between public users and innovative industries.

2.2 STRENGTHENING THE FOUNDATIONS

In order to further the implementation of the second major area of action called for in Annex I of the Council Decision, namely "strengthening the foundations", the Commission in conjunction with the Committee has in 1985 been making progress in several directions all of which where in line with Priority No. 2 on the list of priority actions for 1985 calling for "the organization of transnational activities and dissemination on a Community wide scale of information concerning innovation and technology transfer, in particular:

a) results of research and development;
b) technologies developped in regions of the world where information is difficult to obtain;
c) opportunities for cooperation between business concerns, particularly small and medium-sized undertakings;
d) supply and demand in transferable technologies, e.g through technological data bases, exchanges and exhibitions;
e) industrial property and innovation;
f) technical standards and regulations.

2.2.1 Dissemination on a Community-wide scale of results of research and development

With regard to this priority, the Commission further implemented two Actions which already started in 1984 namely: the Europeanization of conferences (Action 4) and the Eurotechalert scheme (Action 2).

2.2.1.1 Promotion of the Europeanization of Conferences on Technology and Innovation (Action 4)

The idea behind this Action is to help organizers of conferences on technology and innovation to give an European dimension to their event, more specifically by bringing in speakers from other Member States, by making a special effort to reach potential participants from countries other than that in which the conference is to be

held and by translating and circulating the proceedings throughout the Community. During 1985, the concretization of this idea further progressed along two lines.

First, during the second half of 1985 the first 10 of the 21 "Europeanized" conferences that were selected for partial Community funding following the 1984 Call for Proposals "for the promotion of European conferences on technology and innovation" - see OJ C210 of 10 August 1984 - were held. The subjects of these conferences were:
- Optics (Besançon, France);
- Higher Education in support of regional economic and industrial development (Ennis, Ireland);
- Composite materials (Bordeaux, France);
- Organization and functioning of a local innovation office (Athens, Greece);
- Biotechnology (Hanover, Federal Republic of Germany);
- Building the European Electronics Industry (Brussels, Belgium);
- Transfer of aerospace technologies to other industries (Toulouse, France);
- Technology transfer and licensing in the energy sector (Copenhagen, Denmark);
- Photonics applied to metrology (Strasbourg, France);
- Preventive Maintenance for Industry (Dublin, Ireland).

The Commission is committed to undertaking in 1986 a formal evaluation and investigation of the factors that determine the success of these conferences but will do so after the other 11 conferences, which are scheduled to take place in the first half of 1986, have taken place.

Second, the Commission's proposal for repeating this Action in 1985 and 1986 received a favourable opinion from the Committee on 26 and 27 February 1985. The 1985 Call for Proposals for the Promotion of European Conferences on Technology and Innovation - see OJ C125 of 22 May 1985 - that was consequently launched yielded 51 complete proposals of which 23 were selected for support. Most of the conferences selected are scheduled to take place in the second half of 1986 and the first half of 1987, and the topics to be covered are as diverse as computer-aided trade, rheology, information in biotechnology, extrusion technology in the food industry, aerosols, and image detection. The amounts offered for each conference range from 4 500 ECU to 30 000 ECU and the total amount which the Commission allocated in 1985 under the scheme is about 400 000 ECU.

2.2.1.2 Eurotechalert: a European technology awareness scheme (Action 2)

The aim of this project, which is based on the same idea as the British Techalert scheme, is to supply European industry with information abstracted from the many technical reports on government and public research which represent a potential source of innovation for the creation of new products, for the application of new technologies and for improved manufacturing and processing methods.

Reports which are likely to be of immediate interest to industry will be selected and condensed into brief synopses by specialist teams and made available to national trade journals covering a very wide spectrum of fields.

While the concept of the Eurotechalert scheme had received a favourable opinion from the CIT already in 1984, much of 1985 has been devoted - through a group of national experts convening twice - to the elaboration of the practical aspects of the project. During the two 1985 meetings of this working group - 4 June and 25 September - the following arrangements were made:

- Seven Member States - namely Belgium, Denmark, France, Germany, Ireland, the Netherlands and the United Kingdom - agreed to participate in a cooperative scheme and consequently to appoint a national body that would assume responsibility for the cooperation in the project;
- The United Kingdom, benefiting from its Techalert experience, agreed to act as management and advisory centre, with respect to the operation of the project;
- Each participating Member State would supply monthly an agreed minimum number of synopses and would also be responsible for the dissemination within its borders of the documents that it would select from those available within the system;
- The Commission would give the project support up to 200 000 ECU - i.e an estimated 165 000 ECU for translation and 35 000 ECU for the management of the system - spread over two years from the date of start-up.

The above arrangements were discussed at various CIT meetings and received a favourable opinion on 26 and 27 February.

The system should become operational during Spring 1986.

2.2.2 Dissemination on a Community-wide scale of information concerning technologies developed in areas of the world where information is difficult to obtain

Taking into account the findings of a 1984 study indicating that very little use is made in the West of Japanese scientific and technological information and with a view to implementing article 2.1 of Annex I of the Council Decision, the Committee had agreed at its fourth meeting on 21 September 1984 with the setting up of an ad-hoc Working Group on Japanese Information and Technology. The mandate of the ad-hoc group was to investigate and suggest concrete actions aimed at improving the use of Japanese scientific and technological information while taking into account and capitalizing on the results of possible efforts in this respect that were already carried out or were under way in the Community or its Member States.

The ad-hoc Working Group convened twice in 1985 leading to two Action Proposals one for carrying out "an inventory of current facilities for access by Community Member States to new technologies and to scientific, technical and market information in Japan" (Action 15A), and one for conducting a "survey of user wishes regarding access to and the type of scientific, technical and market information in the field of technology and innovation" (Action 15B). Both Action Proposals received a favourable opinion from the Committee on 26 and 27 February.

In order to avoid double work, the implementation of both of these actions has been postponed and is expected to be resumed in 1986 when the results of a large study on Japan sponsored by the Committee of Experts for the Information Transfer between Community Languages (CETIL) will be available. Since some aspects of this larger study are of relevance to both Actions 15A and 15B, it is expected that its results may benefit their further implementation.

In addition to Actions 15A and 15B, a number of concrete proposals for technology transfer, and the setting up of mechanisms for this, were discussed by the ad hoc Working Group and were left in abeyance until such time as the results of CETIL's study on Japan have been reported.

2.2.3 **Dissemination on a Community wide scale of information regarding:**
a) opportunities for cooperation between enterprises, particularly SME's
b) supply and demand in transferable technologies, e.g through technological data bases, exchanges and exhibitions

Activities were undertaken in two directions:
- the extension of a Telefax Communications Network for European technology transfer organizations;
- the development of an European data base for technology offers and demands.

2.2.3.1 **Telefax Communications Network for European technology transfer organizations (Action 18)**

The Committee gave on 26 and 27 February a favourable opinion for the extension of an existing telefax network - that resulted from an earlier pilot project financed outside the Plan - to include most of the important technology transfer centers in the EEC and for the creation of a directory of telefax owners in the EEC who are concerned with technology transfer.

The objective behind the telefax network is to facilitate negotiations regarding transnational commercial exchanges of technology by speeding up communications or by reducing turnaround time compared to ordinary mail and by allowing the transmission of drawings, diagrams, photos etc. which is not possible with the telex.

The network, which contained 27 affiliates at the end of 1984 and 50 affiliates at the end of 1985, is expected to further substantially increase its membership in 1986.

2.2.3.2 Development of an European database for technology offers and demands

The Commission, which, with a view to organizing the European market for patents and licences, had already in 1984 proposed the setting up of an European database on licence offers and demands, withdrew this proposal, in view of the launching, within another programme, of a Call for Proposals for Advanced Information Services, Including Information for Industry - (see OJ No C190 of 30 July 1985) deemed to be more suitable.

2.2.4 Dissemination on a Community wide scale of information regarding industrial property and innovation

The Committee gave on 7 and 8 November a favourable opinion for a partial Community financing to the Greek programme for improving the use in Greece of patents as sources of technological information (Action 24A).

During the discussion of this programme - which is eligible for funding under article 3 of the Council Decision - it became clear that national patent offices, in their current conception and operations, could endeavour to stimulate innovation more intensely. As a consequence the Committee suggested that the Commission set up a Working Group to foster concertation between the Member States on the innovation aspects of patents. This working group will be convened early 1986.

2.2.5 Dissemination on a Community wide scale of information on technical standards and regulations: ICONE (Action 7)

Several Member States have developed through their national standardization institutes - and without a pre-occupying concern for communality - large national collections of technical standards.

The technical harmonization work carried out at European and international level, while being significant, is far from having been completed. At the present time, European and international standards are contained in approximately 7500 harmonization documents, as compared with an overall figure of about 80 000 documents for the national standards of the 10 Member States in 1985. Of these 80 000 documents 28 000 have an European or international equivalent while 52 000 documents do not have such an international or European equivalent. As a consequence, it is often quite difficult for European enterprises - particularly of small and medium size ones - wanting to market new products in the various Member States, without a thorough technical investigation, to identify quickly the

degree of equivalence between different national standards for a given sector or technical branch.

Yet, technical standards when they are harmonized, reduce market fragmentation, therefore contribute towards the creation of a common European internal market, encourage the transfer of technology between the various Member States and their economic agents and define the requirements which the European market imposes on new products.

Within the context of the Plan, the Council called for establishing an up-to-date information system on technical regulations and standards. Rather than setting up a new elaborate system thereby duplicating not only the work of other Community organisations, but also all the information contained in the national standardization institutes the Commission proposed the development of a comparative index linking and comparing national and European standards.

This project, called ICONE and on which the discussion had already started during 1984, was further elaborated in 1985 during two meetings of experts from the Member States' national standardization institutes and - in order to avoid duplication of efforts - representatives from other relevant Community services, the European Committee for Standardization (CEN), and the European Committee for Electro-technical Standardization (CENELEC).

During those two meetings - 17 January and 29 April - it was agreed that the ICONE-system would be designed on a cooperative basis in two phases. During the first phase a comparative index of national standards that have an equivalent European and/or international standard would be compiled. During the second phase a comparative index of national standards without an equivalent European or international standard would be established on the basis of an European classification system.

The first phase - in which also the EFTA participates - will be carried out under contract for the Commission and the EFTA by the CEN-CENELEC in conjunction with the national standards institutes of the participating Member States. This first phase which involves comparing and linking 35 000 documents on national standards, - 28 000 documents on national standards of EEC Member States and 7000 documents on national standards of other EFTA countries - to 7500 key international and European standards is expected to be completed within 2 years and will involve for the Commission a maximum outlay of 185.200 ECU. The format of the expected output of this first phase, as well as the terms of the contract between the Commission and the CEN-CENELEC, were discussed with and received a favourable opinion from the Committee on 6 and 7 June.

Due to the complexity of the second phase, in which the EFTA also will paticipate and which will involve the processing of 65 000 documents - 52 000 documents on national standards of EEC Member Sta-

tes and 13 000 documents on national standards of other EFTA countries -, the national experts agreed to have the CEN-CENELEC carry out a survey among its members, the aim of which would be to define a joint European classification system that would be used as the basis for comparison of the national standards during the second phase.

This survey, which involves an outlay of 7 000 ECU and which should be finished 3 months before the 2 year contract of the first phase expires, also received a favourable opinion from the CIT on 6 and 7 June.

2.3 CONSULTATION WITHIN THE CIT FRAMEWORK ON ACTION ALREADY TAKEN, OR STILL TO BE TAKEN, AT NATIONAL OR COMMUNITY LEVEL IN THE FIELD OF INNOVATION AND TECHNOLOGY TRANSFER

In view of Chapter 3 of Annex I of the Council Decision - calling for concertation of Member States and Community Action - the Committee issued in 1985 a positive opinion on several proposals put forward by the Commission in this respect.

These proposals included three Actions - one for publishing a directory of incentives for industrial research, development and innovation in the Member States of the European Communities (Action 20), one designed to improve the utilization of the results of public or publicly funded R&D (Action 8) and one for evaluating within each Member State the Actions taken as part of the Plan (Action 21) - which, when carried out, will have substantially advanced the implementation of articles 3.1 and 3.2 of the Council Decision.

In addition to the three Actions mentioned above, the Committee also agreed to set up - within its own framework as mentioned by article 3.1 of Annex I of the Council Decision - two working groups, one to foster concertation between the Member States on the innovation aspects of patents (see 2.2.4) and one to foster concertation on design (see 2.1.3).

2.3.1 Revision and New Edition of "Incentives for Industrial Research, Development and Innovation (Action 20) (4)

The Commission had already published in 1985 - outside the Plan - a manual called "Incentives for Industrial Research, Development and Innovation" which is a directory of direct and indirect public measures (in existence or in preparation as of 30 June 1984) for promoting industrial research, development and innovation in the Member States of the European Communities.

Since this directory is the only compilation, covering the European Community as a whole, of national promotion measures - classified

See Footnotes (4)

in ten categories including tax incentives, patents and licensing systems, advisory activities, collective research, collective research centres and government laboratories, equity capital, regional measures, etc. - it is of major interest to national administrations and to industry and provides a basis for the comparisons and evaluations of national experience in the Member States, foreseen in Article 3.2 of Annex I of the Council Decision.

Action 20, which received a favourable opinion of the Committee on 16 September 1985, covers an updated revised edition of the directory that will include Spain and Portugal and that will have 1 January 1986 as date of reference.

2.3.2 Improving the utilization of the Results of Public or Publicly Funded R&D (Action 8)

The reasons for formulating this Action Proposal were the following observations made by the Commission:

1) within the Community an average of two fifths of all R&D work is financed by public authorities and more then one third of this work is performed within institutes run by those authorities;
2) a major justification for public R&D - which is not an end in itself - is the efficient utilization of the results obtained;
3) yet, the task of ensuring adequate utilization is precisely one which has not been dealt with comprehensively in the Member States.

The objective of this Action (Action 8) is therefore, through a series of studies of the way in which the results of public or publicly-funded research are utilized in the Member States, to generate a comprehensive exchange of information and experience in this field

a) leading to the identification at national level of suitable instruments, methods and approaches to particular problems and
b) indicating how to create a suitable framework in Europe for the transnational utilization of the results of public R&D.

The Committee issued a favourable opinion on this Action (Action 8) on 18 September after which the Commission began the first phase of its implementation, namely the organization and start up of the series of studies on the way in which the results of public or publicly funded research are utilized in the individual Member States.

The Commission plans to present to the Committee the preliminary results of these studies before the end of 1986. Preliminary results will also be presented at an European symposium that the Commission will organize during the third quarter of 1986.

2.3.3 Interim Assessment at national level of Actions taken as part of the Plan (Action 21)

The Committee issued on 21 September a favourable opinion on a Commission proposal for carrying out in each Member State - under the responsibility and leadership of the appropriate delegation - an interim assessment of Actions taken so far under the Plan. The Commission expects that this interim assessment will lead to constructive criticisms and suggestions for improvements to current actions as well as to suggestions for future actions.

The Commission expects the first results of these national evaluations to be available from April 1986 onwards.

F O O T N O T E S

(1) The first annual progress report on the Council Decision was published in the NEWSLETTER - NEW TECHNOLOGIES AND INNOVATION POLICY, No. 43 (July 1985). This Newsletter contains information with respect to Directorate XIII - A's regular activities on:
(a) technological information and patents;
(b) scientific and technical communication;
(c) exploitation of new technologies;
as well as information with respect to the progress that is being made in the implementation of the Council Decision 83/624/EEC and calls for proposals that are launched within the context of the Council Decision.

(2) Address of T.I.I. : European Association for the Transfer of Technologies, Innovation and Industrial Information - TII a.s.b.l.
B.P. 1704 (GISL)
7 rue Alcide de Gasperi
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Tel. : (352) 43 80 96
Telefax: (352) 43 83 26

(3) Address of EVCA : EVCA - European Venture Capital Assoc.
Clos de Parnasse, 11F
B-1040 BRUSSELS
Tel. : (32) 2 513 74 39

(4) "Incentives for Industrial Research, Development and Innovation: Directory of direct and indirect public measures for promoting industrial research, development and innovation in the Member States of the European Communities" compiled for the Commission of the European Communities by J. LOVASZ, assisted by N. O'NEILL of J.M. DIDIER and Associates, Brussels; published by Kogan Page Limited, 120 Pentonville Road, London N1 9JN for the Commission of the European Communities (ISBN 1-85091-059-6; EUR 8793 EN).

FINANCIAL SHEET

on the draft proposal from the Commission to the Council on the SPRINT programme (two-year extension and the revision of priorities of the "Plan for the transnational development of the supporting infrastructure for innovation and technology transfer")

1. Relevant budgetary heading

B 752 "Community projects in the field of innovation and technology transfer".

2. Legal basis

- Article 235 of the EEC Treaty;

- Council Decision 83/624/EEC of 25 November 1983 concerning a plan for the transnational development of the supporting infrastructure for innovation and technology transfer (OJ L 353 of 15 December 1983);

- Proposed Council Decision on the SPRINT programme.

3. Proposed classification of the expenditure as compulsory/non-compulsory

- Non-compulsory expenditure.

4. Description of the action, with supporting arguments

The SPRINT programme has the following main objectives:

- to enable innovative firms to benefit fully from the opportunities offered by the Common Market through

  . the promotion of the transnational supporting infrastructure for innovation;
  . technology transfer;

- to promote concerted action by the Community and the Member States to encourage research, innovation and technology transfer;

- to extend transnational cooperation between national or regional services and organizations responsible for supporting innovative firms in the Community, with a view to improving their efficiency and creating an innovation process commensurate with the Common Market;

- to involve the new Member States fully in current actions.

It is not the intention to provide direct aid for particular new technologies but, through transnational actions, to increase the chances of bringing new products on to a Community-wide market and thus to contribute to the achievement of the true internal market.

5. Nature of expenditure

For studies, services, expert analyses, promotion (in particular symposia and conferences) and subsidies, possibly with provision for profit-sharing arrangements if the projects succeed. Any revenue will be re-used under the budget article.

6. Method of calculation

For the period covered by the revised programme (the current plan is due to end on 15 December 1986 and the proposals relate to the period 25 November 1986 to 31 December 1988) the additional appropriations needed for the programme amount to 11 million ECU distributed as follows (commitment appropriations):

1986	-	1 500 000 ECU (transfer from Chapter 100)
1987	-	3 000 000 ECU*
1988	-	6 500 000 ECU
Total:		11 000 000 ECU

These appropriations are provisionally divided between the programme's three main lines of action as follows:

a) European cohesion between innovation promotion organizations:	7 500 000 ECU
b) improvement of structures:	2 500 000 ECU
c) concerted action by the Member States and the Community:	1 000 000 ECU
Total:	11 000 000 ECU

7. Financial effects of the action on intervention appropriations

Estimated timetable for the additional commitment appropriations and payment appropriations for the period covered by the revised programme

	CA (million ECU)	PA (million ECU)
1986	1,5	0,0
1987	3,0	2,5
1988	6,5	5,5
1989	-	2,5
1990	-	0,5
Total	11,0	11,0

8. Community funding in relation to the total cost of the action

- Estimated at 50% of the entire programme.

9. Remarks

This is not a new action but a prolongation of a current action with a very slight extension of the field covered.

/9274
CSO: 3698/A155

*) out of the 4 000 000 written into Article 752 of the preliminary draft budget

EEC RECOMMENDATIONS ON COST R&D PROGRAM

Brussels BULLETIN OF THE EUROPEAN COMMUNITIES in English No 7/8 Nov 86 pp 32-33

[Text]

2.1.39. The conclusions regarding the future role of COST reached by its Committee of Senior Officials at a meeting on 23 and 24 June were transmitted to the Commission, Parliament and the Council, and will also be communicated to the European Science Foundation,[4] the Council of Europe, the Scientific and Technical Research Committee and the Research Ministers of all the COST countries.

In its conclusions, the Committee stresses that COST constitutes the ideal framework for increased and closer cooperation between the Community and the EFTA countries in the R&D sector along the lines indicated in the EEC/EFTA Joint Declaration issued in Luxembourg on 9 April 1984.[5] Bilateral agreements between the Community, certain EFTA countries and other COST countries complement this multilateral cooperation. As a result, the multilateral arrangements adopted for the conclusion of COST agreements falling within the categories approved by the Council in 1978[6] will remain unchanged, although the details could be altered if necessary.

In this connection, Eureka, though its objectives differ from those of COST, could benefit from the 15 years' experience of European cooperation gained in the COST context, which could also serve as a point of departure for certain Eureka activities in fields in which projects having industrial applications are initiated.

Moreover, COST already makes a major contribution to the scientific networks in its area of responsibility, and its close contacts with the Council of Europe and the European Science Foundation should be maintained through the agency of the Commission so that experience may be shared and duplication of activity avoided.

The Committee of Senior Officials believes that COST objectives can be attained with the resources currently employed and that these could be improved by the coordination and exchange of information with the Community, Eureka and other bodies at the time of project preparation; by the participation — where this is felt necessary — of industry, especially small businesses, and users, particularly public bodies, in such preparatory activities; by setting up new technical committees where a definite need exists for a comprehensive view of a given research sector; by the more systematic monitoring of current activities coupled with a final overall assessment of long-term projects; by careful examination of the financing of COST activities and clarification of questions concerning both financing at national and central level (at which new COST projects are promoted) and links

4 The European Science Foundation, based in Strasbourg, is a non-governmental organization made up of science academies and research councils responsible for financing scientific research at national level; it is largely publicly funded.

5 Bull. EC 4-1984, point 1.2.1 *et seq.*

6 Twelfth General Report, point 425.

with Community activities. This examination could give rise to the introduction of new financing methods, which would not necessitate an immediate increase in appropriations for the COST Common Fund.

The Senior Officials also recommend an improved dissemination of information concerning COST R&D activities and their results, a significant increase, particularly at national level, in the publicity given to COST in general and to individual COST projects, and an examination, possibly accompanied by reorganization, of the COST decision-making processes in the case of both national and Community procedures in an attempt to reduce delays.

2.1.40. On 14 July the Council decided to conclude two concertation agreements between the Community and certain non-member countries relating to research in the field of aquatic primary biomass (marine macroalgae) (COST Project No 48) and plant *in vitro* culture (COST Project 87). [1]

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2.1.41. At its July part-session, Parliament adopted three resolutions on European research policy (→ point 2.4.14). [2]

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CSO: 3698/A140

BRIEFS

EEC STATEMENT ON BRITE--Eight new projects have just been selected for the Brite programme. The topics include methods for predicting the effect of surface degradation and fatigue resistance, high-power lasers for materials processing, a laser-robot system for welding formed-sheet steel components, computer control in continuous dyeing, CAD stations, new membrane modules for liquid separation, new materials for deparaffining petroleum cuts and loading the guiding systems for sewing machines. These eight projects supplement the 95 that were selected earlier and are now under way. This coincides with the publication in the Official Journal on 19 June of an advance notice of the second call for proposals for Brite in order to give those interested (especially small and medium-sized firms) sufficient time to find partners and prepare proposals. The formal call is expected in late 1986 or early 1987. [Text][Brussels BULLETIN OF THE EUROPEAN COMMUNITIES in English No 6 Sep 86 pp 35-36]/12828

FRG RESEARCH ASSOCIATION PROGRAMS--The board of the German Research Association (DFG) has now decided to implement 17 new DFG priority programs. In addition to several programs in the humanities, three new main efforts in the biosciences are being started: "Molecular Basis for Biological Pattern Formation," "Genetic Mechanisms for Hybrid Breeding," and "Dynamics and Stabilization of Neuron Structures." Seven new priority programs concern natural sciences: "Complex Diversifications," "Application Oriented Optimization and Control," "Theory of Cosmic Plasmas," "Atom and Molecule Theory," "Small Bodies in the Solar System: Origin, Development, and Significance for the Formation of Planets," "Hydrology of Built-up Areas," and "Continental Deep Drilling Program of the FRG." In the area of engineering sciences, three new priority programs have been established: "Objectbasis for Experts," "Seed Crystal Formation and Growth (Mechanisms and Kinetics)," and "Dynamics of Many-Body Systems." In the approximately 100 DFG priority programs, researchers from various scientific institutes and laboratories cooperate for a limited time within the framework of a given theme, although each carries out his activities at his own research facility. Mutual coordination of studies is accomplished both through the efforts of a coordinator and colloquia which are mostly annual. The duration of a priority program is usually 5 years at present. The DFG has allocated a total of DM178 million in 1987 for the subsidy of its priority programs. [Text] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 443, 17 Nov 86 p 9] 8617/12851

CSO: 3698/M094

S&T EXCHANGE IN EUROPE--Brussels, 16 Jan 87 (VDI-N)--Because of parliamentary questions, the EEC Commission has recently been concerning itself with the mobility of European scientists and engineers. In response to these questions, the Commission promised to reinitiate discussion within the EEC Council of Ministers of the recommendation submitted 18 years ago concerning so-called engineer guidelines. In the view of the Commission, there have thus far been no missed opportunities in Brussels. A specific example of a "Europe of researchers" is supposedly the Community plan for stimulating the scientific and technological potential of Europe through the gradual elimination of barriers, which have stood in the way of intra-European cooperation. This plan, adopted in March 1985, provides for support of cooperation between research groups from various member states, or between individuals who wish to join a research group in another country. Since the adoption of the plan, more than 13,000 statements of interest and requests for information have been received. "This has resulted in more than 300 ties between 764 laboratories, relating to 25 different projects." The Commission stresses in its response that the plan, which is to run through 1988, "has been "helpful already in the training or specialization of several hundred junior researchers." It is notable that all the member states, regardless of their level of scientific and technical development, have taken part in the plan, said the statement, written by EEC Commissioner Karl Heinz Narjes. [By Rolf Spitzhuettl] [Text] [Duesseldorf VDI NACHRICHTEN in German 16 Jan 87 p 1] 12271

CSO: 3698/298

HUNGARY: FUNDS EARMARKED FOR ADOPTION OF CAD/CAM

Budapest NEPSZABADSAG in Hungarian 12 Jan 87 p 5

[Article by Katalin Bossanyi: "Smart Factories; Or, Will the CAD/CAM System Remain a Phantom in Industry?"]

[Text] Computer aided technical design and production control, known throughout the world by the English abbreviation CAD/CAM, is also referred to as a ghost factory, among other things because the use of this complex efficiency improving method--with more productive, more precise and better quality manufacture--is also accompanied by considerable manpower savings. But this solution, counting as peak technology, can also be regarded as intellectual because research and development and introduction of it require the coordinated knowledge and experience and intellectual capital of many professions.

In this plan period the domestic spread of CAD/CAM is being aided by several central research and development programs financed in part by the OMFB [National Technical Development Committee] and in part by the Ministry of Industry--in the hope of moderating our technical backwardness. So it is worth reviewing: Where does the introduction of this unique method stand in the branch best suited to receive it, in the machine industry?

Measurable Savings

At the Ministry of Industry they listed several dozen factories where the beginnings of the advantages of using CAD/CAM can be discovered already. And they noted that if I wanted to get to know a really clever system, one realized from their own material and intellectual capital investment, then I should look up the ship factory. So I went to the Angyalfold factory unit of Ganz-Danubius.

Here the integrated data, material and parts processing system was built up to automate the design and manufacture of various steel bodies and structures. Twelve terminals, various electronic storage devices and a special plotter are connected to the computer room. At my request one of the engineer-mathematicians left his work and--as a demonstration--pressed a button on the terminal. First a green point appeared on the screen. Moving as quick as the wind it outlined, in minutes, the geometrically complex drawing of the bow of a ship.

Naval architect Janos Gotz, chief of the organization main department and father of the winning of the CAD/CAM system here, explained enthusiastically:

"What you see is only one element of a towboat being built in our Obuda factory unit, but the computer is already designing all its parts. Earlier all this would have tied down 2-3 months work time of a number of engineers. With the aid of the plotter we are preparing the steel sheet cutting model best suited to the production program, it indicates the most advantageous material use and scrap generation. We pass this on to our preparatory plant on Nepsziget where they guide the NC controlled flame cutting tools by this method. Actually it is thanks to computerized design and production preparation that we can cut the manufacturing time for each such boat from 1.5 years to 8-9 months, which is a basic condition for our remaining on the market. This not only improves the productivity of equipment but also reduces production costs, primarily stockpiles. In addition, thanks to computerized monitoring, there is a way for continual norm adjustment and quality control."

"How expensive is this system, and how long have you been working on developing it?~

"We began computerized simplification of design work and development of a parts database in 1973; so far this has cost 80-90 million forints. This is also why it has dragged on so long."

"Where can this method be used outside of ship manufacture?"

"In all plants producing many sorts of complicated parts in small and medium series sizes. But for the time being there is little interest in it."

Nor did the chief of the organization main department suppress the fact that even at Ganz-Danubius, despite their noteworthy achievements, they are just at the very beginning in spreading computerized design and production guidance. The lack of money is not the only reason for the progress. At least as important is how ready a shop is to receive a CAD/CAM method requiring extraordinarily precise, disciplined, organized work. This is also why the leaders of the large enterprise decided to progress only step by step and solve the complete computerized guidance and control of each plant unit within a few years.

The Electronic Measuring Instruments Factory (EMG) chose another path. As Pal Geza Nagy, chief of the designing section, said, they began to manufacture various machine tool controls in large series in the middle 1970's. To do this they carried out a comprehensive technological reconstruction and discovered in the process that because of the lengthy and minute hand designing of printed circuits the utility of the entire development could become questionable. So they got a production control computer to do fast designing work. The system began to operate in 1980, but it soon turned out that for many reasons correcting the errors was taking as much time as the development and planning itself. So they "devised" new computerized equipment and today they design several thousand types of printed circuit cards yearly for the EMG and other users. At present manufacturing and inspection are also controlled

by their own computers. The three technological phases have not yet been put together into a uniform system. Deputy director general Janos Goz summed up their experiences this way:

A Tool To Increase Profit

"We received considerable OMFB money to introduce the CAD/CAM system. One of the conditions for this was that we would work together with the associated enterprises. So similar systems were built at the BHG [Beloiannisz Communications Engineering Factory] and the Telephone Factory. We coordinated the developments and since then we have been constantly exchanging programs."

"Can the results of the CAD/CAM system be measured in forints?"

"Indeed so. Thanks to improved productivity our profit proportional to sales receipts is already 27 percent, which counts as a rarity even in the electronics industry. And we would offer this method to other enterprises also, even as prime contractor, if there were demand for it."

Of course according to foreign experiences the real area for a fast spread of CAD/CAM systems is primarily the machine tool industry, or possibly all plants where many sorts of parts must be processed and assembled. This is why the efforts thus far of the Csepel Machine Tool Factory are something to think about. Deputy director general Gabor Hajnoczy said:

"Working with the SZTAKI [Computer Technology and Automation Research Institute] we developed in 1982 a computer controlled integrated manufacturing system out of four processing centers of our own manufacture and this system has been producing reliably since. Well, if we do not want to lag too far behind the developed industrial countries then we must go farther in using flexible systems, that is systems capable of manufacturing and checking with great precision a number of types of parts in the course of the production process. This is why we entered the competition at the Ministry of Industry and undertook, in return for 109 million forints, to build the first domestic model system by the end of 1987. This will consist of three Csepel CNC controlled processing centers and automatic parts serving, tool setting and tool exchanging equipment. A separate computer will guide the controls; it will give the program, manage the production process, check the tools and in the meantime measure and indicate and repair errors. A single worker "in a white coat" will provide supervision of the entire system each shift. The only trouble is that the domestic electronics industry--lacking suitable incentive--will not undertake such a swift development. So we will have to get the electronics from capitalist firms."

"This project is aimed only at computerized production control. Why not supplement designing with this method too?"

"Because for us, unfortunately, the money is provided 'parceled out.' We are testing computerized design with OMFB aid too, but that cannot be connected to this program."

"What profit will realization of the model system bring to the enterprise?"

"This investment will not pay off immediately, for the savings in wage costs are not proportional to the technical expenditures. Considering the general shortage of money we cannot be very hopeful that too many customers will turn up to buy such complex systems in the years ahead. But there is a definite advantage--we will remain in the forefront in technical development, so by realizing the model system the general 'good will' of the enterprise will improve."

"Why don't you get together and concentrate your resources, with the Machine Tool Industry Works for example?"

"Look, we are actually competitors."

Matyas Jakab, director general of the Machine Tool Industry Works, cast light on the other side of the coin this way:

"We feel that it would be a shame to develop in parallel, but if the people at Csepel are successful we will take over their experiences. Until then we prefer to cooperate with the Budapest Technical University, because so far we have seen more practical profit in that. We have already sold a few of the computer, machine tool, manipulator combination manufacturing cells developed jointly. Although they will not be 'big business' very soon because under present conditions of regulation the use of new technology simply isn't worth it to the enterprises."

The Lack of Common Effort

Matyas Horvath, the internationally famous leader of the machine manufacturing technology faculty of the Budapest Technical University, has been struggling obsessedly for years to get longer range economic considerations and new incentive solutions aiding this implemented for the domestic spread of peak technology--in accordance with international practice. He summarized his position thus:

"Despite the efforts of the technical development collectives of some enterprises, efforts worthy of respect, the CAD/CAM method is spreading slowly and even where it is used its effect is rather like an island. The general organizational level of our industry and the resistance to the new have a role in this, but a greater factor than this seems to be the Hungarian management sickness of 'we have nothing in common.' Here everybody wants to develop and adapt independently although abroad, even despite the sharpest competition struggle, the related professions would unite their intellectual and material resources in the realization of such an important struggle, and the market effects would be felt only in regard to the final product. They--the Ministry of Industry alone--want to turn more than 2 billion forints to R and D work on computerized design and flexible manufacturing systems during the Seventh 5-Year Plan. And the enterprises--instead of forming associations and joint undertakings--are competing separately, so it is to be feared that this money will be scattered. There must be another way! For example, the MTA SZTAKI, which has the most computer expertise and applications experience, would gladly undertake--even in the form of a joint stock company--to act as patron for and spread these methods, as a prime contractor."

Yet another idea, confirmed by experts, should be added to all this. The efficiency of the research and development phase for the new method can be regarded as outstanding--despite the problems mentioned--compared to industrial applications. The successful R and D projects "hang in the air" because they are not supplemented by economic development-investment programs which can be realized in a concentrated way in the really efficiently managing areas of industry. Without this the "smart factories" will come to nothing more than another missed chance to catch up technically, a phantom image.

But we must not let this possibility slip, we must seize and embrace it.

PHOTO CAPTION

Designing a printed circuit on the computer of the EMG.

8984
CSO: 2502/24

HUNGARIAN UNIVERSITY DEVELOPS MICROPROCESSOR CONTROLS

Budapest UJ IMPULZUS in Hungarian No 24, 29 Nov 86 p 28

[Article by Dr Peter Magyar: "Software Instead of Hardware, Microprocessor Control Equipment"]

[Text] Software instead of hardware, a program instead of a device--even at first hearing it is an idea which promises much. And realizing it in electric drives has many advantages. The staff of the automation faculty of the BME [Budapest Technical University] recognized this. AEG Telefunken has purchased their developmental achievements, the know-how and license for the system.

The chief advantage of microprocessor control equipment is that the systems created are very flexible because of the universal hardware and the specific software, and their intelligence grows. The program can contain additional tasks in addition to the control algorithms in the strict sense. For example it can contain indications for various signals, parameters and data, postings, monitoring and indicating operational and error conditions, self-check, self-set and control of safety shutdown when a failure occurs, to mention only a few. The development in Hungary began upon recognizing these advantages. The first results were obtained at the automation faculty of the BME.

One of the people from the faculty had worked in the Control Technology Institute of the Braunschweig Technical University in 1980-81 on a scholarship from the Alexander von Humboldt Foundation. Continuing the similar work of the institute he prepared a second version of a completely digitally controlled direct current drive in 1982 after returning to Hungary. A research and development team was then formed at the faculty; this was joined by one of the institutes of the Kalman Kando Electric Industry Technical College while the National Technical Development Committee and the Ministry of Industry provided support for the creation of systems suitable for industrial use. The chief goal was the development of a microprocessor control system for electric drives fed from network commutation rectifiers, primarily direct current drives.

In the course of the developmental activity they created completely digital direct control, diagnostic and setting hardware and software modules for network commutation drives. From these modules they built the following sample systems:

--a general purpose direct current drive,
--a synchronous rectifier cascade drive,
--an alternating current splitting asynchronous motor drive,
--an asynchronous starting and excitation control system for a synchronous motor drive,
--a cycloconverter asynchronous motor drive, and
--a direct current main drive for an NC machine tool.

On the basis of the sample systems a number of significant domestic firms (the EVIG [United Electric Machine Factory], VILATI [Electric Automation Institute], VBKM [Electric Equipment and Appliance Works] and GANZVM [Ganz Electric Works]) and AEG Telefunken purchased the know-how and license for the system. The utility of the systems delivered is shown by the fact that after the necessary local adaptation there have already been a number of industrial applications.

The VBKM delivered two 200 kW asynchronous cascade drives to the Taurus Rubber Industry Enterprise in 1984 and in 1986 delivered to the Szekesfehervar Light Metal Works a 60 kW direct current guillotine shears drive and ten direct current line drawing group drives, drawing about 1,000 A per group, and placed them into operation.

On the basis of the know-how purchased the VILATI developed a card family fitting its own drive system and expanded the technological software. Experimental operation of a 60 kW direct current cylinder adjusting drive will be completed soon. Presently they are working with the BME automation faculty on a prototype for a 160 kW asynchronous cascade drive for a diesel test bench series manufacture of which is expected to start in 1987.

Together with those who sold the license the EVIG has developed microprocessor control equipment for the direct current main drives of NC machine tools. This system uses three processors; in addition to direct control of the drive it has a very broad range of diagnostic, error indication and protection programs and a program package helping to put it into operation. Experimental models are already in operation in several places and series manufacture is expected in 1987.

Experimental systems are in operation at a number of firms,and they are doing adaptation, further development and expansion work. The developmental activity of those selling the license has not stopped either; at present they are working on an excitation system for a synchronous motor drive; the user will be the Danube Petroleum Industry Enterprise. They are also designing an elevator drive which will work with an alternating current splitting asynchronous motor. Simultaneously they have begun development of microprocessor controls for other types of drives, such as direct current splitting vehicle drives, direct current servo drives and frequency changing asynchronous motor drives.

Industry developmental work is not the only condition for introduction of microprocessor drives; this also requires experts. For this reason these systems are also used in training. Since 1984 the BME students specializing in

heavy current have been able to master the new technique in the course of their laboratory and thesis work; the special engineering course at the Kando college helps to create the industrial background. A work committee called "Digital Control of Rectifiers and Electric Drives" which has been working since 1985 in the Hungarian Electrotechnical Association also serves this goal; it offers a regular forum for interested experts.

8984
CSO: 2502/17

HUNGARIAN MICROELECTRONICS FIRM STRUGGLING AFTER FIRE

Budapest MAGYAR HIRLAP in Hungarian 22 Dec 86 p 9

[Interview with Dr Bela Balogh, director general of the Microelectronics Enterprise, by Ilona Kocsi: "Not Only the Machines Burned Up"]

[Text] What burned to ashes in May was not simply a manufacturing line worth a billion. The destructive fire at the Microelectronics Enterprise (MEV) caused serious problems for domestic microelectronics. Here if anywhere even development, free of all shocks, would be important now. Too much time was lost in the 1970's on debates, on convincing those who cast doubt on the domestic development of the branch. And now this fire, which again fanned into flame the embers of a debate which seemed to be dying out.... We asked director general Dr Bela Balogh how he saw the role of the MEV, and of microelectronics here, and what moral and material damage the fire had caused.

[Question] There were many reports about the fire at the time, but finally, what precisely caused it?

[Answer] The committee conducting the investigation established that human neglect did not cause the misfortune, rather it was a technical failure that could not have been foreseen....

[Question] Yet another reason why the new silicon wafer manufacturing line should not be built--as was said several times in May--at the old spot, near a residential area. Has a decision been made about this proposal?

[Answer] It is certain that the chip factory will go to a new location, but at the moment I cannot say more than this. Since we would like to bring in foreign capital and technology for the reconstruction our future partners will have a say in this too. It seems probable that the factory will remain in Budapest, because the conditions cannot be ignored--microelectronics culture is largely tied to the capital, primarily to North Pest; here one finds the skilled work force which cannot be moved as you please. And it cannot be far from the development either, for chip manufacture is extraordinarily research intensive....

[Question] And capital intensive too. According to reports the manufacturing line which burned down was worth 2 billion forints, but the actual damage was much greater.

[Answer] The physical damage was more than one billion forints, that is the value of the machinery and material destroyed. But this does not end the list of losses, for the users were hurt, and I have not even talked about the moral loss. It is a fact, however, that the firefighters were still at work when the "crisis staff" formulated the fundamental task, the trouble had to be isolated, it could not crash over onto the industry. According to this decision we import those wafers or chips on which the Gyongyos and Budapest assembly and testing are based. Of course, import is not realized overnight either. Partly because the possibilities of the socialist partners are limited and partly because we had to get precisely the type of chips we had been manufacturing. So we could not dispense with reliability tests, and this takes a thousand hours. Scheduled manufacture was upset a number of times, and we did what we had the necessary ingredients for. In any case, the half year extra import cost five times more convertible exchange than if the MEV had manufactured the products.

Dubious Praise

[Question] So the processing firms did get the parts needed for their production?

[Answer] With some hitches, but yes. Recently I have frequently heard the observation that "one cannot notice the destruction of the fire." This was dubious praise. It meant that the joint efforts of the MEV and the EMO [Elektromodul electronic parts trading enterprise] were successful; the consequences remained within the gates. At the same time there was often a sort of overtone to the observation. As if they would say, "So, you see, there is no need for domestic microelectronics."

[Question] Is it not possible that it is just that you are more sensitive than usual? This would be understandable, the fire burned a modern manufacturing line to ashes, and with it years of devoted work by many people.

[Answer] I don't know. It is a fact that here at home microelectronics was always surrounded by gigantic debates, and there was only one reason for this: The branch is extraordinarily capital intensive. In addition it is more difficult to point to a direct return; it may be an--indispensible--element only for the success of others. The necessary resources were never entirely available, so it was always simpler to debate the justice of the developments. Restoration will again require money, no small amount, so maybe the old observations are being voiced again.

[Question] Perhaps the operation of the MEV thus far gives foundation for criticism. Many expected a miracle from the birth of this enterprise, and in the course of the years a good number of these hopes have proved vain....

[Answer] The balance is not so negative; compared to 1982 we have produced one billion more semiconductors, although this does not cover half of the Hungarian parts need. Despite the obvious development the underfulfilment is

obvious too. But still I do not understand the exaggerated hopes. Where did they come from, what fed them? The investments of the past 5-year period went one step up the vertical structure, the rest could not be afforded. One cannot make a leap in this way, one can achieve solid growth.

[Question] I do not want to mention the May fire too frequently but the new time calculation in domestic microelectronics is necessarily linked with it. One hears opinions that in addition to the great damage the catastrophe was useful--it created an opportunity or a constraint to implement a developmental conception better than the earlier one.

[Answer] It is a disgusting thing to mention a useful profit in connection with this misfortune. It is primarily in an economic situation where the ability of the country to bear the burden moves at its limits that the performance necessary for an upswing doesn't appear. It is not only naive it is outright ill will to say such a thing, and I definitely reject it. It reflects the view that the old must be destroyed for the sake of the new, of development. Why? The chip factory was not so bad; its faults--if any--derived from the lack of money. I do not accept the philosophy "I tear down in order that I may rebuild"--not in microelectronics nor in a broader sense. On the other hand it is natural in the present situation to find and implement the best developmental conception in accordance with the circumstances.

To Decide in Time

[Question] This view suggests that a serious situation prompts one to decide.

[Answer] Decisions should be made not early or late but in time. Necessity often leads to byways. Decisions conceived in pain are most often problematical. There is not enough time for circumspect consideration, for taking account of broader interdependencies, the decision has a good deal more of emotional, short-range elements. Of course, a decision which has been turned over and pondered more than necessary is equally dangerous. Things have their internal laws and one must decide when these laws dictate, not sooner or later.

[Question] Still, a forced situation has been produced. It must be decided from what source to rebuild the manufacturing line which burned down. The MEV does not have enough money for this, not only because of this year's events but, according to reports, the profit of the enterprise has remained below what was planned in general. And what about the other development scheduled for this period?

[Answer] The economic situation of the MEV has been shaken, but I think that the fate of the developments does not depend on this alone. These grow beyond enterprise frameworks, they require state resources--as virtually everywhere in the world the budget gets into microelectronics. If we want to develop, to improve domestic supply--and this is the goal put before us--then the investments cannot be shelved. Even staying in place requires money. Anyway we are not the only ones in a bad material position, the other parts manufacturing firms are too. In 1986 it would have been possible to assume 400 million in credit and the enterprises were able to assume only a fraction of this, they did not have strength of their own for the rest. And if I look at

the early development prescription for the Seventh 5-Year Plan then the time proportional investment in the branch would have had to be 1.4 billion forints in 1986....

[Question] The modest developmental possibilities indicate that this branch has not become truly dynamic here, has not become a branch stimulating other areas....

[Answer] The profit content of parts manufacture in itself is not high anywhere, it is not here either. With the present regulation we are not capable of earning the income which would ensure at least preservation of the value of the property. So the ageing of the machines has begun here too; at the same time my technical conviction tells me that realization of the selective industrial policy demands, among other things, the fast development of precisely this area--in the interest of other areas.

Our Place in the World

[Question] Many are saying that the fire increased our backwardness compared to the middle field of the world....

[Answer] Even before this, looking at microelectronics as a whole, the only realistic goal was that the gap between us and the developed countries should not increase. It is naive to hope to catch up across the board. We must find those partial areas, gaps, where we are able to reduce our lag significantly, or even eliminate it. There are such areas. But if we are frank we must confess that in the present situation the gap could increase. We fell back with the burning of the chip manufacturing line. In the developed industrial states they are pumping hundreds of billions of dollars into this area; even Czechoslovakia, for example, has prescribed 7-8 billion crowns in its current 5-year plan for microelectronics and the GDR serveral times this amount. We do not have the material possibilities for this, at most for one or two areas.

[Question] The manufacture of equipment oriented circuits (BOAK) might be such an area?

[Answer] The BOAK has become a symbol; in the eyes of many it has become a symbol of our failure. Albeit the philosophy of development is still unbeatable--we must manufacture products requiring higher intellectual expertise, because these are more expensive, more valuable. We have set up for this--even with the errors appearing in practice--but domestic industry has had more need of things worth pennies. So we should satisfy domestic needs much better in quantity than in value.

8984
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AUSTRALIA, DENMARK UTILIZE HUNGARY'S LAOCON CONTROL SYSTEM

Budapest OTLET in Hungarian 8 Jan 87 pp 8-9

The LAOCON Story

[Article by Bela Vanyi: "The LAOCON Story"]

[Text] The LAOCON is not a magic cube, although it is a significant invention, which represents something fundamentally new in computerized control technology. Nor is it a Rubik's Cube in regard to its fate, for it appears that it got to market in time. It is another question, however, whether the LAOCON might be a Trojan Horse with which Hungarian industry breaks into the world market for peak technology. The small black boxes do not even carry the inscription "Made in Hungary." And here is the link between the Rubik invention and the story of the developers at MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences]. The quotations taken from Andras Mezei's roman a clef "The Hungarian Cube" about Hungarian innovation unfortunately fit even too well the chapters of our report. So let us begin right off with Mezei....

> "How did it become what it could, and how did it not become what it might have?"

The story began with a minor scandal. In 1978 the MTA SZTAKI appeared with its new control system for a CNC machine tool at the Chicago Machine Tool Industry World Exhibition, which counts as a great event in the trade. One of the consequences of the appearance was an "interpellation" voiced in the American Senate which questioned the embargo measures pertaining to similar equipment. The Dialog control system contained a number of solutions classified as "super embargoed."

After that the Chicago success inspired the SZTAKI developers to try to create something entirely new in computerized control technology. Development began virtually at the moment of their return home, and not much later the idea for the LAOCON was born in the head of Dr G. Istvan Rakoczy.

In one of the offices of the SZTAKI two workers for the institute's subsidiary enterprise COSY [Cooperative Systems], project chief Otto Halmosi and

marketing manager Imre Kiss, tried to describe the turns of the Hungarian LAOCON legend, so difficult for laymen to understand.

As Imre Kiss explains it each traditional automated system control consists of a computer connected to the equipment by thousands of wires and cable bundles and connected in turn by more multistrand snakes of cable to a central control unit. Rakoczy began to "saw up" these computers--in professional jargon, the "racks"--and created little, independently intelligent modules which could carry out control tasks separately or built into a chain. They are suitable for independent work and parallel task solution, and work without a central control unit. One of the innumerable advantages deriving from all this is that there is no need for bundles of cables.

"Due to the fickle nature of fate," Imre Kiss said, "it is always the innermost line in a cable bundle that fails (there must be some truth in Murphy's Laws). At such times, for security reasons, the entire bundle must be replaced. This is not a cheap game, as is well illustrated by the fact that the cable costs for an automatically controlled electric locomotive are 660,000 forints."

"The several dozen kilometers of cable in a complete system cost many times this amount; for example, in the case of central control of an entire factory hall," Otto Halmosi added, "the cost of the 'strings' can reach 60-70 percent of the total investment, and this is not even to speak of the unending work of maintenance and repair."

"In contrast to all this the LAOCON modules can be connected together with simple 'chicken gut,' with two-line wires," Imre Kiss continued. "Dealing with failures can cause no problem, the LAOCON's own self-diagnostic system immediately indicates the faulty module. All one needs to make repairs is an electrician with a screwdriver. In addition the system can be continuously expanded, connecting more and more modules. The system independently programs the new members, and the developers have also worked out a possibility for linking several loops."

Then, of course, all this existed in theory. As Imre Kiss said, they had a workable solution but they didn't know what to do with it.

"Foreign trade is incapable of making a distinction between goods and goods. Among the institutions side by side and subordinate to one another matters grow old before their time. All those who see, as they go along, what will happen cannot get their subjective intuitions accepted in a decision system which always demands objective proofs."

"The developers began to peddle their invention," Imre Kiss continued. "Foreign trade was, to put it finely, skeptical. 'Go tell your auntie that a system can work this way.' The truth is that Hungarian foreign trade is not prepared for such tasks. They don't have people to make the deals who have the professional training, and they are not interested in entering into deals with doubtful outcomes with an unknown product. Speaking frankly they don't have the money for it either. For all this would require marketing work eating up large sums, and how much more profitable to sell a thousand tons of wheat or

beef through well known channels! The majority of the Hungarian foreign trade enterprises, in their own interest, are happier to deal in goose feathers and chicken pieces than in electronics. Of course there are exceptions. There was a firm that would have taken on the LAOCON, but only for a 25-30 percent middleman fee instead of the customary 5-7 percent."

This is the moment when the question becomes unavoidable as to why they did not try domestic manufacture first. But before the answer let us quote Mezei again.

"What good is it to abolish the plan directive system if economic guidance does not want to let anything out of its hands? If, instead of one strong hand, many little institutions today grab power with both hands,... if the decisions made at the microlevel are not limited at the macrolevel, but rather the guidance system imposes the same limits as subtasks in its own dismemberment...."

The developers had a dream, they believed that it would be better for everyone if at last one time we could export not a technical solution, not an intellectual product, but rather a device, a manufactured product. It quickly turned out that their idea was illusory. The number one point about the LAOCON was reliability, which also meant that 70-80 percent of the parts would have to come from capitalist import. The authorized import ratio for a product of a Hungarian enterprise today is 7-10 percent. There was another idea--a number of firms import control technology equipment which the universal LAOCON could replace, so obviously these foreign exchange sums could be regrouped to obtain the parts for the new system. But who can know who brings what into the country through the most varied channels within the frameworks of the most various commodity exchange agreements? And, of course, there were opposed interests. At a number of enterprises the possibility for Western trips would have been ended with one blow if the LAOCON replaced the imported devices.

"Do it yourself, my lord, if you have no servant!" Relying in part on their own international contacts the developers "retrained themselves into marketing and propaganda experts." They prepared the "traveling circus," an operating LAOCON loop, built into a suitcase; they wrote 1,200 letters to various firms, they looked up the journals dealing with technical novelties, which even published their announcement free. In the meantime helpers appeared too. For example, Imre Kiss transferred to the service of the LAOCON cause from the foreign trade enterprise which would have undertaken sale of the system for a 30 percent middleman fee. Through Elektroimpex they got in touch with a businessman of Hungarian extraction dealing with result displaying boards who, having no capital of his own, tried to recruit money men in Australia. It is not by chance that the hope of success first shone here. Because--as appears from the words of Imre Kiss--the LAOCON has not reaped undivided success in other parts of the world despite all its grandeur and novelty.

"In Western Europe and America we were trying with a product which not one of the firms contacted would have sold to us because of the embargo restrictions. This would have been the smaller problem. But with its universal abilities the LAOCON would have upset the developmental strategies of many world firms. There were places where they told us this indirectly, and there were places

where they told it over white tablecloths. Not one of the enterprises specializing in automation and computerized control of various areas undertook the odium of giving up their own developmental staffs or developmental policies for the sake of the LAOCON. Australia, on the other hand, was an ideal area from this viewpoint, because it is a dynamically developing economy which politically falls out of that sphere which might be influenced by embargo measures."

The Australian connection brought a turnaround in the LAOCON affair. Our former compatriot succeeded in finding suitable money men and the most fortunate area. Backward Western Australia is a supported area for Australian industrial development, and the president of the firm founded on the LAOCON succeeded in winning over the former governor. Luck or inspiration? As a first step the newly formed company got into the "America's Cup" business. The America's Cup means to Australians what the Mundial means to us. This event occurring every 4 years, the race of the 12 meter yachts, is also bringing life and business into Perth, the home of the Australian LAOCON firm. Last year already security equipment assembled from LAOCON modules protected the cup, and took down the results. All this was worth an advertising campaign of several million dollars. In the meantime the Australian firm grew into an undertaking with base capital of 25 million dollars, which can manufacture and sell the equipment in Australia, the Fiji Islands, New Zealand and Southeast Asia, paying the SZTAKI 10 percent per module. All this is only part of the cooperation; already today the computer cards are packed in Hungary, further increasing our country's share in the business.

With the aid of a little foreign trade enterprise, Contrex, the LAOCON is also breaking into Europe; the Danish enterprise Labotek has bought the license. Traditionally the firm deals with synthetics industry machines and their controls; it has representation in 40 countries of the world. They will try to exploit the abilities of the universal LAOCON in these special areas.

Have we sold out the LAOCON? Probably the question is a bad one, for the developers had fundamentally surveyed their possibilities. But before we go on let us again quote Andras Mezei.

"Matters pass around. They seek their patrons, but the patron is national economic interest and not a person--it is an abstraction. And abstractions are incomprehensible."

A little area, four times 2 meters, in the SZTAKI, a few computers, disassembled LAOCON sandwiches. This is the scene of the domestic development. The former inventors of the LAOCON are all in Australia or Denmark now, but they "work for home." Their every new idea increases the income of COSY, SZTAKI and Hungary. What are their possibilities? We have already talked about the 25 million dollar Australian undertaking. The Danes bought a designing system for the LAOCON project which the USA is not happy to sell even to its Western European partners. What would be 2 months work here at home they can do in 2 days with this system. And for all this a slanderous tale--scientific circles here at home held back the development of the LAOCON saying that

scientists and researchers should not get involved in business, should not seek a market, should end their work with the theory.

"...Not only do inventions and initiatives grow old in the bureaucratic apparatus, decisions do too. Our economy is not prepared to accept surprises. Aladdin would wander about the institutions and offices in vain; even if they believed in the magic lamp no one would have time to go out to look for the treasure."

So the LAOCON is beginning to run in a home away from home. "How have the chances of the system increased here at home?" I asked Imre Kiss.

"It already lives at a synthetics industry enterprise in Debrecen and the system is now being brought to life at the central heating works in Keszthely. There is increasing interest in the modules arriving from Australia and in those assembled here at home. But the problem with the majority of the potential partners is the same as with the world firms--they are not inclined to give up their accepted,worked-out development policy, and they are not inclined to give up the import which is accompanied by much travel and which is associated with better sounding names. It continues to be a pity to talk about domestic manufacture. Not only is it difficult to reduce the ratio of imported electronic parts but--in a characteristic way--it appears to be an insoluble task to find a domestic manufacturer who is capable of manufacturing the trapezoid profile rubber bands (!) which go on the modules."

But more essential than all this is that while the "Made in Hungary" modules would cost between 20,000 and 55,000 forints all this moves between 225 and 400 dollars in the Australian cooperation.

In conclusion it is necessary to repeat the introductory question, "How did it become what it could, and how did it not become what it might have?"

Might the LAOCON also have become a competitive Hungarian product on the world market? Perhaps what has been said justifies the laconic answer, No.

Report from Australia

Budapest OTLET in Hungarian 8 Jan 87 p 9

[Interview with G. Istvan Rakoczy, of the SZTAKI, by Z. M.]

[Text] We reached G. Istvan Rakoczy, a colleague of the SZTAKI now working in Australia with an individual employment permit, on the telephone in Perth, Australia. It was a bit of luck because the clocks in Budapest showed 8:30 in the morning but it was 9 hours later in Perth, and working time had long ended.

[Question] I would be interested as to why the very forward-looking LAOCON system, which stands before a great career here at home too, had to be further developed in Australia?

[Answer] I'll tell you how it all happened. The system which we call LAOCON today was patented at the SZTAKI in 1979 and then, for years, only very little work was done on this theme. For some reason the leadership then did not consider it important enough. Only in 1984-85 did development reach the stage where we had a model that could be shown and we exhibited it at the Budapest International Fair, looking for applications and manufacturers.

Since 70-80 percent of the parts of the LAOCON could be obtained only from Western Europe the domestic manufacturers showed no interest in it.

Then foreign parties showed interest, including somebody from Australia. When he returned home he organized an exhibit here, on the fifth continent, where the system pleased many. On the basis of this a venture capital company got together the money and created a firm called Laocon Limited for further development and manufacture of the system.

[Question] How did you all get out there?

[Answer] Three of us came out, with individual employment permits, in order to help the technology transfer. And we came here because this company was the first which provided money for the LAOCON. Since then the system has been sold in Denmark and India and, as I understand it, talks are taking place in other places also.

[Question] Why is the system considered competitive overseas?

[Answer] Partly because of its many-sided nature, partly because of the favorable price. The product closest to the LAOCON in ability, which can communicate in a network and which is intelligent in itself, is nearly five to ten times more expensive in the United States and about 20 times the size. We offer one LAOCON box, which has the computer in it and the entire thing packaged in a waterproof aluminum alloy box, for about 350 American dollars. That is incredibly cheap.

[Question] What size series is manufacture being done in now?

[Answer] We are now starting a thousand unit series; so far only 500-600 units have been made since in the elapsed time we have put together a number of reference systems. Anyway, the firm itself is not too big, it now employs 26 people. I am the technical director and my colleagues work as software developers.

Report from Denmark

Budapest OTLET in Hungarian 8 Jan 87 p 10

[Interview with Bent Kold Larsen, president of Labotek, by Z. M.]

[Text] The Danish purchaser of the license for the LAOCON system is the Labotek joint stock company, the president and technical director of which recently held talks at Contrex in Budapest. We talked with president Bent Kold

Larsen, after two days filled with meetings, in the car of the Budapest enterprise hosting him on the way to the airport prior to his departure.

[Question] Please, briefly describe your enterprise!

[Answer] Labotek manufactures equipment for the synthetics industry. We ship these machines to Hungary, as to other parts of the world. Permit me not to talk about our turnover, but I can tell you that we employ 1,100 workers in Denmark, our machines are manufactured there exclusively. We work with 35 wholesalers selling our products from Australia to this half of Europe.

[Question] How determining a role does Labotek have in synthetics industry machine manufacture?

[Answer] I certainly could not call the importance of our firm a determining one, for we have very strong American, FRG and Italian competitors. But I believe that we are certainly among the biggest. For the time being our market share in the United States is small, but it is very large in Europe and the Far East.

[Question] How did the contact get set up, the tangible result of which is that you have become a user of the LAOCON system?

[Answer] Our Hungarian representatives got in touch with Contrex through Technoimpex and someone asked if we would be interested in such a computerized control system. The market for such equipment appeared to be a still unexploited area for us and since they asked we looked at the documentation; we judged the manufacture of control systems to be suitable for us to get into a new business sphere.

[Question] What will you use the LAOCON for?

[Answer] It can be used on practically every machine manufactured by us, the older ones and the brand new ones. Our marketing strategy is extraordinarily clear--we have exclusive rights for use of such control systems in the Western European synthetics industry. So we have started market research to discover what other branches, in addition to the synthetics machine manufacturing industry, we might get into. It appears there are rather many possibilities, for example in the area of security systems, but elsewhere too. For the time being we must decide what our next step should be. We have created a brand new division at Labotek which will deal only with LAOCON, with market research connected with its use and with organizing manufacture.

[Question] What volume of sales can you count on in the near future?

[Answer] We count on assembling about 200 complete systems next year, in our original operational area. First we must introduce the LAOCON on the market, but after this is done we count on extraordinarily fast growth, we see a very big Western European future in the LAOCON system. In the original contract there was mention of manufacture of 4,500 modules in the first year and a half (the contract was signed at the beginning of this year). Of course installation depends on how many boxes go into each system. For example, five

modules are needed for the central unit of our central heating systems, but there are also auxiliary units.

[Question] How much more expensive would similar products be? How much extra does the LAOCON offer you?

[Answer] We see a gigantic advantage in the LAOCON compared to Western European systems with similar abilities. This is the perfectly distributed intelligence among central and peripheral systems. In a word, this is what we cannot find in the Western European developments. The price we will use is not yet entirely clear; our present market research is called on to make clear how much our competitors will sell similar products for in Western Europe. For the time being the prices of our products will not distinguish whether they were assembled with the LAOCON or with another system. On the basis of the most recent price list--which we compiled on the basis of an exhibit in Dusseldorf last month--it appears that the prices of our competitors are about 20-25 percent higher than ours. Each module will cost 3,000-4,000 Danish crowns (they give about 7.5 Danish crowns for one US dollar), but naturally the final price will be determined by how extensive the system is. In a word, we are talking about a product which is competitive from both technological and price viewpoints.

Director Sums Up Lessons

Budapest OTLET in Hungarian 8 Jan 87 p 11

[Interview with Dr Istvan Eszes, managing director of the MTA SZTAKI]

[Text] From time to time one can see at the SZTAKI a black suitcase; in it is an operating model of the LAOCON system. We asked Dr Istvan Eszes, managing director of the MTA SZTAKI, to what extent the LAOCON story could be regarded as a model for dometic innovation.

[Answer] The LAOCON case is only partly typical. In contrast to research institute practice the creators of the system struggled devotedly, even in the developmental stage, to have the system be a marketable product. In our country it usually works just the other way around. When a product exists, then the search for manufacturer and market begins. In general they make a prototype, take it out to some fair where, let us suppose, a possible partner comes by and asks whether the article is being manufactured and how much it will cost. Then either the vendor bluffs or the honest inventor admits that there is no manufacturer yet, and he has no idea if there will be one. Then the possible partner quickly passes on. For what can be done with a Potemkin box? True, the bluff does not usually pay, for it really is hard to find a manufacturer for new products, the parts supply is uncertain, import policy keeps changing, by the time an entrepreneur scrapes himself through all the authorization procedures to import the necessary parts the new article has lost its novelty. The computerized graphics system is a good example of this. From the birth of the idea to manufacture, or let us say to broader use, was 10 years. Even today, in-house, we have a number of developments we didn't finish, weighing the possibility that by the time it could be manufactured

under domestic conditions it would either be obsolete or so expensive that it would lose its competitiveness.

[Question] How did the LAOCON avoid this fate?

[Answer] Partly thanks to the fact that the developers themselves struggled for their invention with greater than average ambition, and succeeded in finding similarly obsessed helpers. On the other hand we transferred the LAOCON to our subsidiary, COSY, in time. I might say with a little exaggeration that if it had stayed here it would have been developed on and on, and development is not the same as manufacturability. The COSY, on the other hand, as an innovation management firm, is also strongly interested in market success.

[Question] Can it be imagined that someday domestic electronic parts manufacture will reach the point where we can manufacture here at home out of largely domestic parts our world level patents?

[Answer] Although the press, and thus public opinion too, buried the Primo, the domestic school computer, I still do not regard the development of the Primo as a failure. It contained in itself the possibility of building up a domestic innovation chain embracing machine manufacture, development, trade, instruction and service activity.

On the other hand--although I am not the person to speak on this question--I am certain that even if our possibilities permitted it we would not have to be self-sufficient in electronic parts. A few mammoth firms in the whole world are specialized to manufacture this or that part. Studying their activities we must find the gap which competition has left open, and in exchange for these bring in the other, missing parts.

Hungarian Application

Budapest OTLET in Hungarian 8 Jan 87 p 11

[Unsigned note printed with the above articles.]

[Text] One promising attempt at a domestic application of the LAOCON began recently in Keszthely. The LAOCON modules were assembled in the heating works for a 600 dwelling housing area. With the aid of thermometers placed in so-called reference dwellings the system measures the temperature and the modules in the heating center automatically control, on this basis, the temperature of the heating water. Hereafter they will not have to calculate what temperature water to let into the dwellings, but this is only part of what they expect from the system. Data collection done with the LAOCON will indicate heat losses, make possible the preparation of comparison tables, in the final analysis preparation of more rational heating programs, which the system itself will then control.

In the first step the people at Keszthely devoted three million to the automation. (Although the LAOCON system itself is quite cheap they had to put five digital thermometers in the reference dwellings, and they cost 4,000 forints each.) The results of "laoconization" can be expected only in the more distant future. The experiments will also show if our construction industry is capable of manufacturing well insulated dwellings and with the aid of the LAOCON it may be possible to significantly reduce the energy bill of the heating centers.

8984
CSO: 2502/23

OFFICIAL SUMMARIZES STATE OF BRAZIL'S NUCLEAR EXPERTISE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Dec 86 p 29

/Text/ Yesterday /Wednesday, December 17, 1986/, the president of the National Nuclear Energy Commission /CNEN/, Rex Nazare Alves, while lamenting the sensationalist news reporting of some newspapers, stated that "Brazil is not in a position to make the atom bomb and has not yet mastered that technology." He pointed out that Brazil is just now mastering the technology of laboratory-scale reprocessing, as O ESTADO DE SAO PAULO reported six months ago in an article on the parallel program.

Rex Nazare pointed out that, besides not having yet acquired the industrial technology for reprocessing, Brazil does not have plutonium on a sufficient scale to justify the investments necessary for industry. For the time being, according to him, there are laboratory-scale simulations and development of various equipment with private industry.

The president of the CNEN denied reports that Brazil had produced plutonium in two 320-meter-deep ovens from enriched uranium in the Cachimbo mountain range in southern Para. Rex Nazare stated: "I have never seen plutonium manufactured in ovens anywhere in the world. Plutonium is obtained from the irradiated element of the power reactors. All of Angra I's burned fuel which could be used for reprocessing is under the absolute control of the International Atomic Energy Organization in Vienna, and Brazil has to account for that inventory gram by gram."

More important than producing some plutonium, he said, is enabling Brazilian industry to enter the nuclear age and become qualified for the time when it will be necessary to reprocess that material on an industrial scale for quick regenerating reactors (which reuse spent fuel.) For that reason, he pointed out that the parallel program counts on the collaboration of more than 50 private firms in a process of granting patents and developing products, which will inevitably lead Brazil to master the whole fuel cycle and obtain full nuclear qualification in the next few years.

The CNEN president stated that, along with private industry, the parallel program is developing leaded glass technology. This glass is made of a lead alloy to stop radiation when the extremely dangerous

irradiated fuel is handled through it. Brazilian industry has already developed this glass with the technique and safety necessary to protect the handler. The only shortcoming is that greater clearness and transparency are needed.

Another product being developed by Brazilian industry, according to Rex Nazare Alves, is the teleprocessor, formed by an ensemble of robots directed from an electronic panel. In addition, several chemical products for reprocessing are gradually being obtained in this process of interaction with private initiative.

According to Rex Nazare Alves, the foolish secrecy which surrounds the manufacturing of nuclear products is not the important point. He points out: "The London Club exists and is carrying out an extraordinary boycott against Brazil by not allowing us to import a series of products and components of nuclear origin. Behind the keeping of military secrets and the justification of the advanced countries that it is a question of sensitive technology, the main objective is not to keep Brazil from making the atom bomb, but rather not to let us modernize our industries and become self-sufficient in a series of state-of-the-art technologies such as advanced chemistry, computer science, and robotics, which were born out of the military effort to build the bomb."

He pointed out that, for example, we cannot import a high-powered computer for the CTA--the Aeronautics Technology Center. We have had to produce other chemicals such as boron and phosphoric acid domestically because selling them to Brazil was forbidden. Now that we have mastered boron technology, we are producing teflon and freon domestically. With phosphoric acid technology also mastered, we can cut our imports even further, because even Coca-Cola uses that product in its secret formula. Rex Nazare recalled that, in this regard, Brazil imports nearly $300 million worth of sensitive products that will soon be produced domestically with the development of the parallel program. In addition to being expensive, there is a lot of red tape involved in importing those products, and there have been cases in which sales of medical and hospital products were even vetoed: the London Club simply answered that Brazilian patients should be treated overseas, in order not to surrender a few radionuclides and the instruments necessary to handle them.

In order to explain that Brazil "in no way" is in a position to build the atom bomb, Rex Nazare stated that the news that "the Aeronautics Technology Center had already gotten 90 percent enriched uranium is pure fantasy." Also in the enrichment process, several processes, all on the laboratory scale, are being developed in the armed forces institutes and in the civilian organizations under CNEN's control.

According to Rex Nazare Alves, the uranium enrichment processes that are being developed within the parallel program are: chemical, laser enrichment, ultracentrifugal, and plasma enrichment. All these processes are of an experimental character, because Brazil has not mastered that technology, he concluded.

9895
CSO: 3699/43

BRAZIL PROPOSES TO SURPASS FRANCE IN S&T BY 1989

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 4 Jan 87 p 31

/Text/ Advisers to Science and Technology Minister Renato Archer believe that 1987 will be decisive for Brazil's computer science policy. It is during this year that advancements in this sector will be most noticeable and when the country will begin to be recognized in the area of science and state-of-the-art technology in the international marketplace. And it will be decisive because the sector will be very close to getting its feet firmly on the ground, "inasmuch as external and internal pressures against this objective will be moving quickly toward loosening their grip." He states: "If we maintain the current rate of growth in the area of science and technology, we will surpass no less than France in 1989." And he notes that this prophecy is not his own, but comes from the WASHINGTON POST.

Minister Renato Archer stresses that the Brazilian government is not going to give an inch in its computer science policy. He considers maintaining this policy vital in order for Brazil to enter the 21st century as master of its own brain, that is, keeping all its scientific and technological knowledge in national hands. But, for Minister of Finance Dilson Funaro, this position of keeping the computer science policy advanced does not mean a position of intransigence. He says that the Brazilian government is willing to discuss its policy, specifically, to explain it in greater detail to those who see in it a "seven-headed monster," which, in his opinion, it is not.

For Funaro, an example of the fact that a good conversation can yield good dividends is the understanding that the Brazilian government has reached with Clayton Yeutter, the White House's special advisor on foreign trade affairs. "We have not changed the computer science law, we have not caused any retreat in the government's policy, and we have succeeded in getting the United States at least temporarily to suspend its threat of trade retaliation against Brazilian products."

In the heat of the argument surrounding the computer science policy, a word of support has come from outside: "If Brazil wants to reach the level of the developed countries such as the United States, Japan, and West Germany, it will have to follow the path of protectionism

and market restrictions for as long as it takes for its fledgling industry to get on its feet. This attitude is legal before the international organizations such as GATT (General Agreement on Tariffs and Trade), and it was exactly in this way that those countries got where they are now." This advice comes from economist John Kenneth Galbraith, former economic adviser to President Kennedy, and it was given by Galbraith himself to President Sarney during a meeting they held in Planalto Palace.

For Minister Renato Archer, nevertheless, Brazilian protectionism in the computer science area will not impede development of multinationals. In fact, the minister stresses, IBM's Brazilian operation has been its most profitable subsidiary in the whole world.

9895
CSO: 3699/43

SURVEY SHOWS BRAZILIAN COMPUTER FIRMS FACE MAJOR OBSTACLES

Sao Paulo DADOS E IDEIAS in Portuguese Nov 86 pp 14-26

[Text] The Brazilian computer industry, in its various segments, has found ways of coexisting with high growth rates during recent years, without confronting major problems or bottlenecks. The companies have been rising above an immense potential market, which just recently has become more demanding in terms of prices and quality of products. But now the industries are faced with a serious obstacle, the limitations of their own production capacity, creating an essential need for making sizable investments for the expansion of assembly lines and manufacturing equipment, in addition to those required to develop products.

A sampling taken by DADOS E IDEIAS among nearly 60 leading firms in the sector discloses that the majority are already operating at 100 percent of their capacity; and some have been forced to make countless adjustments or to establish varied shifts in order to use their equipment beyond its limits.

To avoid constraints, business owners are investing, with their own funds or through financing procured primarily from the National Economic and Social Development Bank (BNDES) and from capital of third parties, through sales of new stock shares. However, a greater difficulty has begun to crop up, which money cannot solve over the short term: a lack of specialized personnel to work in the companies. And, at present, there is virtually no place in which to procure this type of labor, either in professional schools, training centers, or universities.

Among the various segments of the computer industry, the constraint in production lines is greater precisely where the investments are most lagging, because of the need to use sophisticated machinery, with precision mechanics: it involves industrial automation, which found its orders exploding even before the Cruzado Plan.

The components and peripherals fields are also very close to constraint, if they have not already reached it, with orders that will absorb their entire capacity for another 4 to 6 months. In the terminal industry, responsible for the end products (computers), there is still a small margin, from 20 to 30 percent at most, yet to be occupied; but the companies are encountering

not only a lack of parts and components, but also a shortage of peripherals. And without them, computers can make little progress.

The industries are also complaining that the import quotas for computer equipment are currently unsatisfactory, but the high interest rates for circulating capital, which amount to 50 percent per year in our economy, are not cited by the sample as a major problem.

In the statements from the companies, it becomes evident that the computer industry has an assured space for growth in times of recession or expansion of the economy as a whole, with or without monetary stability. In other words, the Cruzado Plan halped, but even if the era of the cruzeiro had continued, the sector would still be operating at full steam now. In recession, the companies as a whole need computer equipment to improve productivity and cut costs. And, during a phase of expansion, they need to raise their production and also improve productivity. So it is not coincidental that computers are big business anywhere in the world.

Personnel Lacking

"The employment rate in the manufacture of digital equipment in Romi Industries is 100 percent, with regard to numbers of persons. Whereas, if we consider the coefficient on production capacity, there is no doubt that we have idleness," remarks Giordano Romi, chairman of the company's board of administration. Nevertheless, the group will have a billing of $110 million this year, 40 percent more than last year.

Romi produces computerized numerical commands (CNC), specialized equipment for the management of machinery, tools, and injectors for the processing of plastics and similar machinery in general. It manufactures 5,500 machines at the facilities in Santa Barbara D'Oeste (Sao Paulo), Santo Andre (Sao Paulo), and Joinville (Santa Catarina); the latter having been acquired at the beginning of the year.

But, as Giordano Romi remarks, "At the beginning of 1980, the company, with a small production capacity, had 5,000 workers, a figure which declined to 2,300 during the black September of 1983 (a period marked by the Mexican and Polish moratorium, when Brazil lost credit and failed to pay its bills abroad)." He adds: "Later, we attained only 4,000 employees. Recently, we opened slots for technicians and workers specializing in electronics, but we have not succeeded in filling them."

Mentat Advanced Basic Systems, Inc, which also operates in the field of industrial automation, is not only suffering the same difficulties as Romi in finding engineers and technicians, but is, in addition, attempting to add personnel even through unusual training with university curricula and that of Brazilian technical schools. Hermann Robrer, coordinator of technology, brings up a problem more difficult to solve: "In a 4-year project, we are nationalizing the R-3 robot, which was developed by Manutec, a German subsidiary of Siemens. But how difficult it is to find personnel skilled in robotics in the country!" he exclaims.

These two companies, like countless others operating in the vast range of segments producing digital equipment, have ambitious investment plans amounting to millions of dollars, over periods of from 1 to 2 years. But, so as not to end up caught in the serious predicament of a lack of qualified technicians, in many instances they are sending personnel abroad to be trained. Jose Carlos Saraiva, marketing supervisor for Maxitec, which makes numerical commands and programmable controllers, explains: "We are offering courses abroad not only for those who have been here for some time, but also for the new personnel hired. It is the solution."

The company, which has an employment rate of 100 percent, has orders dating to July 1987, and is still accepting orders; but the delivery period is about 6 months. Saraiva comments: "Next year, we want this time to be reduced to 3 months. To achieve this, we shall have to recruit on the personnel market both for the development area and for the production area." He would like to create at the factory an environment using the Japanese Kanban-type technique, now chosen by Asians as a guarantee of increased productivity.

AIT (Industrial Automation and Telecommunications) is no longer seeking engineers in the still little known field of robotics. As Antonio Carlos Tubino, the company's commercial director, remarks, process control is a technology that is more widespread, but it is also "very difficult to find personnel specializing in the field. The solution is for us to train and prepare our own personnel."

The situation of a manpower shortage at the giant Romi fits in with that of the young AIT, both in the field of industrial automation, in which the overwhelming demand for equipment gives an incentive for ambitious investments, proportionate to the size of each. The lack of specialized personnel, including engineers, chemists, physicists, technicians, and marketing and sales people, is not confined to this segment alone, but extends to other computer areas as well.

Hence, it becomes obvious that the soundness of the national policy for the sector has been weakened owing to a situation which, according to the minister of science and technology, Renato Archer, has no short-term solution in the universities. He observes: "The solution is for companies and traditional training centers to work together, or concurrently, to check this process, which requires an extensive adjustment in the curricula of educational institutions.

Step Forward

It was not without reason that SID Microelectronics headed a meeting with several Brazilian universities to request and offer assistance. The company is having trouble forming its cadres. It has 60 technicians and is in immediate need of 40 more, whom it cannot find on the market. The lack of specialists could jeopardize a project which, this year alone, involves $6 million;

and, by 1990, the anticipated sum is approximately $80 million. Over the short term, SID Microelectronics intends to import "brains," meanwhile also heading toward integration with universities, so that the latter may make use of the company's laboratories for training.

A similar difficulty is being experienced by Elebra Microelectronics, which has been on the market for a year as a supplier of imported components. This month, the firm is introducing products with native components in the fields of integrated circuits and optoelectronics. In October, according to its president, Jose Ellis Ripper, it had 70 employees; and by the end of the year that number should increase to several hundred.

The computer and peripherals industry is also facing a shortage of specialized labor, although it has strong allies, such as the young but significant maturing of the segment, and the mere fact that it has the mounting activity as a leading endeavor. But, nevertheless, the competition among the professionals, from the marketing to the research area, is great. This has prompted the companies to offer profit-sharing and extremely easy conditions for purchasing stock shares, among other measures, for the purpose of improving the pay and offering greater enticements.

Even Scopus, the first computer company to open up capital and to have employees as shareholders, concerned about providing an extremely inviting personnel policy, has been encountering problems: Valter Haller, its industrial director, complains: "Everything is lacking here, even guards. It has become increasingly difficult to procure qualified professionals on the market."

Microlab, a traditional manufacturer of peripherals for computers and equipment directed toward industrial automation, has also created a very special personnel policy. In this company, the welding or plant worker can, without any trouble, enter the board room and make a demand. The entire chain of command is trained so that no one will feel that his authority has been threatened or hurt, if the worker should visit President Antonio Didier Vianna. There are many benefit plans. Courses are offered on all levels, whoever wants to may become a shareholders in the industry (the participation has been over 90 percent); but "there is a lack of skilled personnel both in the commercial and the development areas," admitted Jose Roberto Cardoso Junior, manager of the peripherals department.

Like Microlab, SID, Itautec, and many other companies, Cetus Computer (a manufacturer of local systems) has headed toward an internal training program. Max de Oliveira, the firm's commercial director, reports: "We have permanently in the company a group of apprentices (an average of 10) who are third year electronic engineering students. So, we train them and later hire them."

Since, obviously, one cannot escape the law of supply and demand, the (pseudo-frozen) salaries are constantly rising, and the "spot market" is so attractive that it ends up enticing university professors or technicians from industries who have sworn that they were in shirt-sleeves and were carried away by the development of a product that seemed particularly intriguing. After all,

there are very few who would resist the offer of having their salary doubled or tripled (sometimes raised even higher).

Passing the Buck

Orders that are not explicit and are poorly planned by the suppliers, and insufficient import quotas: on this side are the manufacturers of parts and components for the computer industry and that for its peripherals. The charging of premiums, disorganization, poor quality of products, too many orders, or even incapacity to produce (explosion of the market and lack of labor): on this side are the purchasers of the resistors, capacitors, keys, connectors, crystal oscillators, transformers, printed circuit plates, or chips (so much in demand on the national market).

The war has been established. There is a lack of components for the manufacturers of peripherals, as well as a lack of peripherals for the terminal industry, and of parts and components for the latter.

For example, Metrixers, which grew 150 percent this year over the previous year (in 1985, it totaled 1.8 million crucados), produced 48 sets of industrial automation equipment as of September; but, in October, it was not accepting orders, owing to the lack of components on the market.

Many representatives of the terminal industry are now producing some of the peripherals that they use. But for the successful SID Computer, for example, the delivery period for micros and minis increased from 30 and 90 days to 90 and 120 days, respectively. "All because of the lack of supplies," stresses Nelson Sany Wortsman, superintendent-director. Sector, a manufacturer of micros, reports that it is experiencing more or less the same situation. At Itautec, which produces 3,000 micros per month, there is a lack of "hard disks, floppy disks, and printers, in addition to the fact that the capacitor suppliers, for example, have requested 50 weeks as a delivery period," reports Carlos Eduardo Correa da Fonseca, its superintendent.

At Microtec, one of the leaders on the 16 bits micro market, the situation is alarming: The company, investing 10 million cruzados, will be moving to a factory that is three times larger. The demand allows for the production of 2,400 computers per month; but now it cannot give vent to its capacity to produce 1,200 micros per month, because there is a lack of peripherals, drives, Winchesters, and keyboards. So, it produces 850.

"The demand in July increased 36 percent over June, and that of August rose 40 percent; but we cannot meet it," claims Leandro Espeves, advisor to the board of directors. This also holds true of EBC, where the period for supplies of printers and Winchesters is 120 days. Helio Santos, the vice-president, complains: "We have products on the shelf, but we won't be able to deliver them to the client until February."

No to Premiums

"We are unwilling to pay premiums," says Carlos Roberto de Almeida Gauch, vice president of Prologica. "Therefore, we are faced with a delay in receiving components. The company is equipped to produce 7,000 micros per months, but the figure is in the neighborhood of 4,000. We intend to put the 32 bits SP micro on the assembly line."

Raul Papaleo, vice president of Edisa, notes that there are suppliers of parts and components who are requesting up to a year as a delivery period. "We are seeking small manufacturers; that is the alternative. We make engineers available to help the suppliers of components and parts. Another solution would be importing, but there is an enormous slowness at CACEX [Foreign Trade Department] in issuing permits."

Another disclosure comes from Luis Edmundo Cunha, commercial director of Digirede. He gives a reminder of the fact that, to manufacture a computer, nearly 5,000 active items are required, demanding countless different suppliers. But, in his opinion, the consequences of the shortage situation are extremely complex. Everything is lacking: keyboards, packaging, parts, peripherals: a snowball.

To Microlab, the periods for delivery of parts are discouraging. For example, in the segment of electronic components, Icotron, which used to deliver capacitors in 5 months, moved the period to 10. Vitramon, which took from 30 to 45 days, has now reached 160 days. The Rohm resistors, which used to be delivered in 30-60 days, now arrive only after 90-120 days. The Thorton ferrites (for transformers) jumped from 60 to 180 days for the supply, and the Fairchild diodes moved from 30 to 120 days.

Ricardo Rodriguez, Microlab's materials manager, claims that there is no declared premium; rather, it is being charged disguised as interest, in 30-day payments. He says that this situation applies to Texas (with circuits) and SID Microelectronics, as well as the DuPont and 3M connectors. He noted: "The interest was 1.8 or 2 percent, and rose to 4.5 and 5 percent (in 30 days). So, a purchase amounting to 10.00 cruzados, which used to cost 11.80 cruzados, moved to 14.50 cruzados. Ricardo Rodrigues comments: "They say that they cannot maintain the price, and therefore they are not accepting orders."

Who Is the Ogre?

Those who may seem to be great enemies of the computer industry, and enemies of the Cruzado Plan, the parts and components manufacturers, defend themselves with arguments similar to those of the equipment producers: "There is a lack of labor; the demand has become too heated; steel and aluminum are in short supply on the market; we are faced with premiums." But they stress that they are investing in the expansion of production, and call attention to the fact that, in the effort to prevent an increase in smuggling, responses must be sought to prevent the expansion of the sector from being jeopardized. The responses may lie in the country's industrial policy of substituting for imports, in the search for a larger trade balance surplus, in the disconcerting management of the Cruzado Plan; or else in the obstacles posed by the state

bureaucracy; because the import quotas have been exhausted, and "there is no sign that the federal government intends to reconsider them until the end of the year," comments Jose Ellis Ripper, of Elebra Microelectronics.

So, the impasse remains.

The Unstable Components Market

An industry which subsists on surprises: this is how Salomao Wajnberg, executive secretary of the Interministerials Components and Materials Group (GEICOM) describes the electronic components industry. He remarks: "It is a high risk, unstable segment, which is suffering mainly because of the fact that the client never keeps it informed of the changes that he intends to make in his orders. The purchaser keeps the product that he intends to introduce a secret, and only when the start of production is near does he report the necessary changes to be made in the parts, or the fact that he is going to deactivate one line or another."

In 1985, the value of the components produced in the country was close to $6.6 billion but, according to GEICOM $4.5 billion has not been allocated to the professional computer industry. It is the entertainment industry that retains the largest amount. Wajnberg remarks: "Therefore, components manufacturers are giving preference to the entertainment industry; it is obvious."

In that area, everything is risky. And, judging from the GEICOM data, it is the same: From 1980 to 1981, the demand for electronic components dropped 35 percent; from 1981 to 1982, it rose 10 percent; from 1982 to 1983, it declined again, but by 22 percent; from 1983 to 1984, it rose 2 percent; and from 1984 to 1985, it increased 24 percent, no more and no less. The expectation from 1985 to 1986 is for an increase of 50-60 percent. With the ups and downs, the index between 1980 and 1985 showed a 29 percent drop.

Wajnberg notes that, in this field, the native companies have slim chances of competing with the multinationals, which are almost always large and prepared for the fluctuations on the market. And he concluded: "It is no coincidence that IBM only agrees to deal with suppliers when it is the one responsible for the purchase of no more than 40 percent of the production."

Peripherals and Auxiliary Equipment

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obstacles to Increased Production
ABC-Data	80-90% (3,000 modems per year, also statistical multiplexers, with undisclosed production volume)	orders up to December 1986; delivery period: average of 90 days	$1 million in equipment for production	raw material (components)
Cetus Computer	100% (17 different sets of equipment for local systems)	orders up to November 1986; delivery period 45 days	creation of branches, export	no obstacles
Conpart	80% capacity (2,500 units in cartridge for magnetic tapes during all of 1986)	orders for the next 6 months; delivery from 90 to 150 days	$2 million in the areas of automation of component tests and rating (own funds and those of third parties)	engineering personnel, circulating capital, raw material (aluminum)
Digiponto	100% (130,000 keyboards per year)	orders up to end of 1987; delivery period varies depending on product line	investments in keyboard assembly units and plastic injection units	raw material (circuit card, print, electronic circuit, mechanical parts)
Eletrodigi Flexidisk	100% (Winchesters, nearly 2,000 monthly, 4,000 drives monthly, beginning in September, new drives this year also)	up to December 1986 average period 3 months (OEM)	new clean chamber $2 million with own funds, $250,000 in new drive development and manufacture	personnel, bank interest, parts and components
Elgin	1,500 printers monthly (but real capacity would be 1,000 monthly)	average delivery period 90 days	$1 million in production line	components and parts

* universe researched

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obstacles to Increased Production
Expansao	90% (910 printers from January to September 1986)	orders up to February 1987; average delivery period 20 days; matrix printers in stock	$500,000 in development and production increase	components, circulating capital
Metalma Plastics	80% (5,000 keyboards monthly)	no new orders until February 1987	new product introduction and other expansion projects (1 million cruzados/month)	demand far greater than production capacity
Microlab	120% (nearly 500 sets of equipment/month - disks and streamer tape, work in two shifts)	December 1987; average delivery 3 months	$500 million, new products, with own funds	personnel for commercial, development areas
Moddata	70% (33 types of communications equipment produced, not counted monthly)	average delivery in 45 days, but immediate is possible	150 million cruzados (in the computer production area and for new product research)	specialized personnel
Parks	60% (1,000 capacity, but produce 600 sets of communication and test equipment)	average delivery period 30 days	nearly 15.6 cruzados in research, training, production, circulating capital, and computer manufacture	parts and components
Percomp	100% (400 rigid disks monthly)	orders up to October 1987; average delivery period 3 months	to triple production in a new factory	components

* universe researched

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obstacles to Increased Production
Racimec	80% (7,100 micros, terminals, printers, and other equipment, also 12,000 electronic plates)	orders up to 1987; delivery period from 30 to 240 days	150 million cruzados programmed, applied to facilities, research, and introduction of new products, with 70 million cruzados already obtained	native parts and components lacking, causing 20% idleness
Rhede	100% (modems factory)	delivery immediate and up to 90 days	investments in the industrial area, amount undisclosed	parts and components - reliability and delivery within preset periods
Scritta	100% (1,750 printers/month)	orders up to December 1986; delivery period: 40 days	factory expansion to raise production to 7,500 printers/month by June 1987	raw material, personnel
Verbatin	100% (750,000 diskettes/ month)	constant sales flow	$1.8 million in factory expansion to bring production to 1.01 million diskettes by February 1987	raw material (plastic and packaging)

* universe researched

Source: The companies themselves

Terminal Industry

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obstacles to Increased Production
Cobra	100% (micros, minis, terminals, and superminis)	up to January 1987; deliveries from 60 to 120 days	400 million cruzados (capital increase) in development projects	government's indecision on national computer policy
Digirede	100% in two factories and 70% in third (assembly), micros, bank terminals, superminis, printed circuits)	delivery period 60 days for commercial equipment and up to 6 months for bank area	own capital and request for BNDES loan to raise printed circuit production	components, keyboards, packaging, and personnel
EBC Computers	100% (150 micros and supermicros per month)	up to December 1986; delivery period from 30 to 45 days	40 million cruzados (new factory as of March 1987) branch opening	long delivery period for peripherals, disks, and printers, circulating capital
Edisa	80/90% (100 supermicros, 500 terminals monthly)	orders for next 4 months; delivery period: 60 days (average)	$1 million in purchase of machinery for production and testing	purchase of parts and components (connectors and integrated circuits)
Itautec	100% (micros, minis, superminis, terminals)	Has orders for delivery in 90 days	new products: PC, IT, and 1.2 Mbytes disk units	personnel for administrative and commercial areas
Labo	100% (40 minis and 180 micros/ month)	orders up to 6 months; average delivery period: 90 days	$6 million in new factory to double production	no obstacles

*universe researched

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmend Investments	Major Obstacles to Increased Production
Medidata	100% (micros, minis, superminis, nearly 300 monthly)	orders up to March 1987; delivery date from 30 to 150 days	amount undisclosed; investments with own funds in production, software manufacture - opening of branches	shortage of skilled personnel, raw material in general
Microdigital	100% (micros and peripherals)	orders up to January 1987	goal to raise production 40% with own funds	lack of components, shortage of skilled personnel
Microtec	70% (850 computers monthly)	delivery period from 45 to 60 days	10 million cruzados to move factory (3 times larger), to double production	lack of peripherals, limiting production with a capacity of 1,200 computers
Polymax	100% (2,500 micros and 700 printers monthly)	delivery period from 30 to 60 days	plan to expand industrial area	lack of components and raw material
Prologica	57% (4,000 sets of equipment monthly)	-	development and production of 32 bits micros (10-13% of budget allocated for research)	shortage of components (premium charge)
Scopus	100% (2,000 micros and video terminals, and 200 auxiliary equipment sets monthly)	up to December 1986; average delivery period 4 months	$1 million in third factory to double production	shortage of specialized personnel, lack of components

* universe researched

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obtacles to Increased Production
Computer Sector (formerly Softec)	78% (450 micros, IBM-PC's, IBM-XT's monthly)	orders up to January 1987; delivery period: from 30 to 45 days	plans to produce IBM-compatible video terminals and AT micro (new factory)	difficulties in purchasing components and peripherals, but has stocks for 1 year
SID Computer	100% (about 2,000 sets of equipment monthly - 1,000 bank terminals and the rest minis, terminals, and micros)	orders up to December 1986; delivery period: 90 to 120 days	completion of new factory in Curitiba ($7.2 million)	lack of supplies delays equipment delivery, personnel
Unitron	70% (3,100 micros, monitors, drives, interfaces monthly)	orders up to December 1986; delivery period: 20 days	plans for 32 bits (Mac 512) micro-computers , expansion of drive and monitor production	

* universe researched

Source: The companies themselves

Industrial Automation

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obstacles
AIT	80% (industrial microcomputers, production volume undisclosed)	orders up to mid-1987; delivery period: 6-8 months	-	personnel
CTL-Computer (formerly Centelha)	100% (numerical commands, readers, and tape punches for reading bar code)	orders up to March 1987; period varies from 5 to 90 days	purchase of machinery to raise production, for quality control, technical assistance, and new contracts	personnel, parts and components (long delivery period)
Comsip	80% (distributed digital control systems)	September 1987; complex projects up to 2 years; simpler ones, from 6 to 8 months	$1.5 million to raise production 40%, personnel training	electronic parts and components, peripherals, personnel
Maxitec	100% (numerical commands and programmable controllers	orders up to July 1987; variable delivery period, averaging 6 months	larger facilities; machine purchase; personnel hiring	personnel
Mentat	100% (robots)	orders up to July 1987; delivery: 8 to 12 months	factory center purchase, $1 million; and $200,000 in computation and metrology	personnel
Metrixer	100% (48 sets of equipment January-December 1986; leather surface gauges and programmable controller robots)	orders up to February 1987; not accepting orders for lack of components	-	raw material (mechanical components), personnel

* universe researched

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obstacles
Romi	100% (5,500 computerized numerical commands yearly)	orders up to May 1987; conventional machines delivery period: 4 months; special: 12 months	$25 million for new factories to triple production and introduce new products	personnel, raw material (components)
Smar	90-100% (electronic transmitters, digital controllers)	orders up to March 1987; delivery: 90 days average	$2 million to centralize manufacturing units, develop new products	competition with imported equipment, personnel
Villares	100% (robots, CLP's, supermicros for process control, micros, local systems, and nearly 10,000 printed circuit plates monthly)	orders up to December 1987; delivery: 40 days average	$1.5 million for new factory and quality control	personnel, raw material

* universe researched

Source: The companies themselves

Components

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obstacles to Increased Production
Aegis Semiconductors	60% (20% of production for computer industry, low employment because company is new)	up to January 1987; average delivery period: 30-45 days	expansion of facilities and machinery	supplies lacking for metallurgy and aluminum sector; personnel
Du Pont	70% (professional electronics connectors, films for printed circuit, metal composition, inks for printed circuit - 80% computer products)	orders up to mid-1987; period depending on product; accepts orders for rapid delivery	$5 million in electronic department, introduction of 4 connector lines (500 different products)	imported raw material, import quota, bank interest (rose from 1.8% in March to 3%), personnel
Elebra Microelectronics	starting production this month, markets imported components	-	three factories (1988, 18 million components yearly)	difficulty with rise in import quota, lag in tax incentives
Heliodynamics	100% (1.2 million monocrystalline silicon plates - 40% of billing)	orders up to February 1987; new orders filled in March 1987	factory expansion from 3,000 m^2 to 4,170 m^2 to produce silicon per se (for plates)	raw material (imported)
Icotron	100% (700 million components yearly, including electrolytic capacitors, tantalum, filters, transistors, integrated circuits, chips imports)	orders up to end of 1987; deliveries: from 3 months to a year	expansion of manufacturing units and of production capacity (investment undisclosed)	equipment for production with long delivery period, imported raw material (lag in delivery)
Itaucom	100% (12 million integrated circuits and printed circuits, not counted)	printed circuits: 60-90 days for delivery; Manaus factory: 1/3 capacity	new equipment, factory expansion, personnel hiring	raw material, personnel

* universe researched

Companies *	Current Employment Level Production Capacity	Orders on Hand	Programmed Investments	Major Obstacles to Increased Production
Multitel	100% (400,000-500,000 parts monthly)	orders up to 1987; average delivery period: 120 days	recent expansion of factory, machinery, and personnel	rise in import quota, personnel
Philco	85% (for computers, produces 2,000 monochromatic picture tubes and those with green and white phosphorus, 12-17 inches)	up to June 1987; delivery period: regular clients, 30 days; new, to be decided	none for next year	raw material (components)
SID Microelectronics	100% (components in general, starting digital circuit production)	-	$6 million for machinery; $80 million by 1990 for digital integrated circuit production	personnel
Semikron	100% (thyristors and diodes, rectifier sources for professional computers)	orders up to January 1987; delivery period: 60-90 days	introduction of new products; creates 1 to 2 new products yearly	import quota, personnel specializing in microelectronics
Texas	100% (40% of the company's production is components for professional computers); to meet the demand, would have to produce 30% more	orders up to mid-1987; delivery period: from 120 to 150 days	-	import quota
Vitramon	100% (70% of production is multilayer capacitors for computers)	orders up to January 1987; deliveries starting February	factory expansion to double production in 6 months	poor planning of orders made by clients

* universe researched
Source:The companies themselves

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SOVIETS ENCOURAGE JOINT VENTURES WITH BRAZIL

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 31 Dec 86 p 23

[Text] Yesterday, in Rio, the executive secretary of the Central Foundation for Foreign Trade Studies (FUNCEX), Elcio Costa Couto, disclosed that the Soviet Union wants to attract Brazilian firms for the creation of joint ventures in the areas of supermarkets and engineering services. He added that the Soviets praised the technology procured by Brazil in those two fields.

According to Costa Couto (who has just returned from a visit to Moscow), the Soviet Union will allow foreigners to hold up to 49 percent of the companies' capital; and, at present, it is discussing the preparation of new, more liberal laws on foreign capital and foreign trade, in addition to completing studies on a definition of what "profit" is. According to Costa Couto, in foreign trade the USSR intends to terminate the present oligopoly, whereby there is a state enterprise in charge of the imports in each sector. The new laws will be more flexible.

Costa Couto, who is a former general secretary of the Ministry of Planning (a position that he held in the Geisel government), and a brother of the interior minister, Ronaldo Costa Couto, remarked: "The Soviets are attracting foreign capital and we, on the other hand, are creating market reserves and speculating on restrictions on capital from abroad."

Yesterday, Costa Couto met with the press in Rio to analyze the conduct of foreign trade, and he expressed an optimistic view. He predicted that the trade balance this year would be $9.5 billion, and that, for next year, the surplus should stand between $8 and $10 billion. In the view of Costa Couto, a considerable devaluation of the cruzado is not so necessary; because he thinks that the decline in exports is due basically to the increase in domestic consumption.

The FUNCEX secretary is of the opinion that the negotiation of the foreign debt will have a widespread effect on the Brazilian economy in 1987, and hence will have repercussions in exports. He deems it essential for Brazil to achieve at least a reduction in the interest payments, so that it can close its accounts. The economist observed: "Even if the trade balance, in the worst case, should amount to $6 billion in 1987, Brazil could procure another $3 billion with credit from agencies such as the World Bank and the Inter-

American Development Bank, and close its accounts with the payment of $9 billion in interest."

Elcio Costa Couta claimed that, a few days ago, he received a document from the Central Bank containing the forecast for exports in 1987, amounting to $24.5 billion, and imports totaling $13 billion; this would give a balance of $11.5 billion, a figure which FUNCEX considers "exaggerated."

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